



City of
Ozark **MISSOURI**
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Sanitary Sewer Study

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DRAFT

Prepared By:



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SUMMARY OF FINDINGS

1. Ozark's current population is 21,060. An average growth rate of 3.0 percent per year was utilized based of Missouri Department of Economic Development projections for Christian County and historical data.
2. The 10th Street Siphon is susceptible to erosion issues caused by the Finley River flooding. As the flooding frequency increases, the integrity of the infrastructure becomes a greater concern.
3. After review of the rate structure, the City passed a rate increase in 2020. The rate increase will take effect January 1, 2021. Sewer customers will pay \$42.00 per month for 5,000 gallons per month of water usage. Customers previously had paid \$31.22 per month for the same usage.
4. A large amount of residential growth is occurring north of Hwy 14. Existing infrastructure must be improved to accommodate future development. Impact fees should be considered to help pay for improvements.
5. Additional sanitary sewer flow must be directed to the Elk Valley Treatment Plant. During dry weather flow, the plant utilizes under 20% of its design capacity.
6. Flow projections show the City has adequate capacity in their treatment plants until 2033.
7. Nine major categories for capital improvements have been identified in the report and are recommended for implementation.

CATEGORY 1 – PROJECTS FOR IMMEDIATE IMPLEMENTATION**Project 1 and Project 2 – Lift Station Flow Meter and Trash Baskets**

Project 1 and Project 2 is the addition of flow meters and trash baskets to major lift stations. These improvements will occur when more substantial lift station upgrades are required.

Project 3 – Riverside Lift Station Improvements

This project was completed in April of 2020. The Riverside Lift Station's wet well was raised above the 100-year flood elevation to eliminate significant inflow from the Finley River during flooding events

Project 4 – Elimination of The Rivers Lift Station

A gravity sewer main approximately 2,422 feet long will be constructed by the City to eliminate The Rivers Lift Station. This project is scheduled to be completed in 2021.

CATEGORY 2 – INFLOW AND INFILTRATION PROJECT PROGRAMMING

This project consists of identifying areas of the City's collection system heavily influenced by stormwater inflow and infiltration (I&I). The "old downtown" area will be the initial focus. This area has deteriorating clay pipe and brick manholes. Cured-In-Place-Pipe of existing clay pipe and cementitious lining of brick manholes will be strategically used to reduce I&I. The City has completed projects in 2018, 2019 and 2020. \$300,000 should be allocated annually to combat I&I issues.

CATEGORY 3 – TREATMENT FACILITY IMPROVEMENTS**North Plant Improvements**

These improvements include replacement of sludge return structure valve (\$24,245), replacement of sludge return slide gate (\$16,250), clarifier #3 and #4 improvements (\$275,000 per clarifier), grit removal rehabilitation (\$350,000) and addition of emergency generator (\$340,625).

South Plant Improvements

The grit removal system has issues with overflowing the grit classifier. City staff has expressed the ability to implement an inexpensive solution to the system.

CATEGORY 4 – WEST OF HWY 65 COLLECTION/CONVEYANCE IMPROVEMENTS PHASE I**Fremont Road Gravity Sewer Trunk Main Phase I**

This project consists of constructing 2,850 lineal feet of large diameter gravity sewer trunk main. Phase I will eliminate the Kali Springs Lift Station. The estimated cost of the project is \$582,589.

CATEGORY 5 – SOUTH OF FINLEY RIVER IMPROVEMENTS**Finley River Lift Station and Force main to Elk Valley Plant**

This project consists of constructing a new lift station and force main to eliminate the 10th Street Siphon. The new lift station will pump to the Elk Valley Treatment Plant via approximately 23,000 lineal feet of large diameter force main. The estimated cost of the project is \$3,889,645.

Redirect Shop Lift Station to the New Finley River Lift Station

This project consists of constructing 3,900 lineal feet of force main to the new Finley River Lift Station. The estimated cost of the project is \$578,266.

Elk Valley Treatment Plant Overflow Basin

This project consists of constructing a 4.0 million gallon overflow basin. The overflow basin is necessary to store high flows experienced during storm events. The estimated cost of the project is \$500,000.

CATEGORY 6 – SLUDGE SCREW PRESS AT ELK VALLEY TREATMENT PLANT

This project consists of constructing a screw press at the Elk Valley Treatment Plant to reduce or eliminate the need for the City to land apply sludge on 3rd party property. The estimated cost of this project is \$550,000.

CATEGORY 7 – SOUTHSIDE SEPTIC ELIMINATION**Phase 1**

This project consists of constructing 9,600 lineal feet of sanitary sewer main to eliminate onsite septic systems and connect 103 existing houses to the City's sanitary sewer system. The estimated cost of Phase 1 is \$891,153.

Phase 2

This project consists of constructing 6,600 lineal feet of sanitary sewer main to eliminate onsite septic systems and connect 51 existing houses to the City's sanitary sewer system. The estimated cost of Phase 2 is \$675,420.

CATEGORY 8 – WEST OF HWY 65 COLLECTION/CONVEYANCE IMPROVEMENTS PHASE 2**Fremont Gravity Sewer Trunk Main Phase 2**

This project consists of constructing 5,150 lineal feet of large diameter gravity sewer trunk main. This gravity sewer will serve sewer pumped from the new Casey's Lift Station. The estimated cost of the project is \$788,014.

Casey's Lift Station (Highway CC and Fremont Road)

This project consists of constructing a new lift station and 4,000 lineal feet of force main. The estimated cost of the project is \$817,570.

Gravity Sewer from Petrus Lift Station to Casey's Lift Station

This project consists of constructing 3,000 lineal feet of gravity sewer main. The estimated cost of the project is \$392,086.

Redirect West Elementary Lift Station to Casey's Lift Station

This project consists of constructing 2,400 lineal feet of force main. The estimated cost of the project is \$374,913.

Redirect Rapid Roberts Lift Station to Casey's Lift Station

This project consists of constructing 900 lineal feet of force main. The estimated cost of the project is \$118,040.

CATEGORY 9 – 30-YEAR TREATMENT PLANNING**Construct Elk Valley Sister Plant**

This project consists of expanding the Elk Valley Treatment Plant to have the capacity to treat 2.0 million gallon per day (mgd). The sister plant would be constructed next to the existing treatment plant. The estimated cost of the project is \$12,000,000.

Expand Elk Valley Treatment Plant to 4.0 MGD

This project consists of expanding the Elk Valley Treatment Plant to have the capacity to treat 4.0 mgd. The estimated cost of the project is \$25,000,000.

Lift Station and Force main to Replace North Plant and Close North Plant

These projects are beyond the scope of this report. There are not any estimated costs for this project.

INTRODUCTION

The City of Ozark is located in north central Christian County 15 miles south of Interstate 44. Ozark was incorporated in 1890 and is the county seat of Christian County. Neighboring communities include Nixa to the west and Springfield to the north. According to the 2010 Census Bureau data, Ozark has a population of 17,820 people with 6,603 households. Estimated population in 2015 was 19,120. The City of Ozark's population in 2000 was 9,665 with 3,636 households. As reflected in the Census data, Ozark is experiencing significant growth. To keep up with growth and maintain services to its constituents, the City must improve and expand its infrastructure.

The City of Ozark provides sanitary sewer collection and treatment for its residents. Treatment is provided by the N. 22nd Street Plant and the Elk Valley Plant. Collection and conveyance is provided by 19 lift stations, gravity mains, and force mains of various size and material.

The purpose of this report will be to analyze the entire sanitary sewer collection and treatment system. Capital improvements will be recommended based on projected growth and maximizing operating efficiency of the system. A financial evaluation of the system will be performed to identify funding capabilities and options for the recommended improvements. The report will project population growth and sewage flows over the next 30 years and recommend projects for immediate implementation along with long term planning.

Portions of the sewer study were updated in 2020. No new sewer flow data was collected or used in the updated study. Analysis of new construction from the original study is not covered in the updated study.

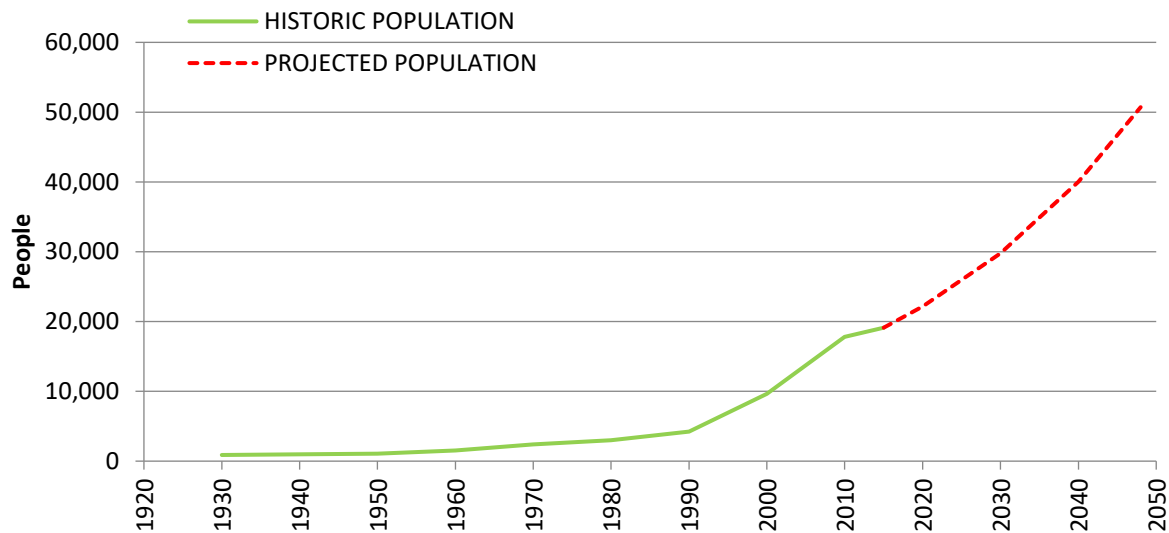


Figure 1 - Aerial Image of the Mill Area

POPULATION TRENDS

Historic population and census data has been gathered from the U.S. Census Bureau and compiled in the following graph. Periods of explosive growth from 1990 to the present make projecting a population growth rate challenging. The Missouri Department of Economic Development projects population growth from 2000-2030 for Christian County at 141%. This projected growth rate annualizes to approximately 3% per year. Christian County is one of the fastest growing counties in the state. For the purposes of this report, a growth rate of 3% per year will be used to project future populations for the City of Ozark over the next thirty years. A chart showing historic and projected population follows.

Table 1: Historic & Projected Population



Projecting population growth of 3% per year correlates with historic growth as demonstrated in the above graph. Projected population in 2048 is 50,713. To account for varying growth rates, recommendations within this report will be referenced to time and population. Current development seems to be concentrated in areas tributary to the North 22nd Street Plant. This will be accounted for in future projections and capital improvement recommendations.

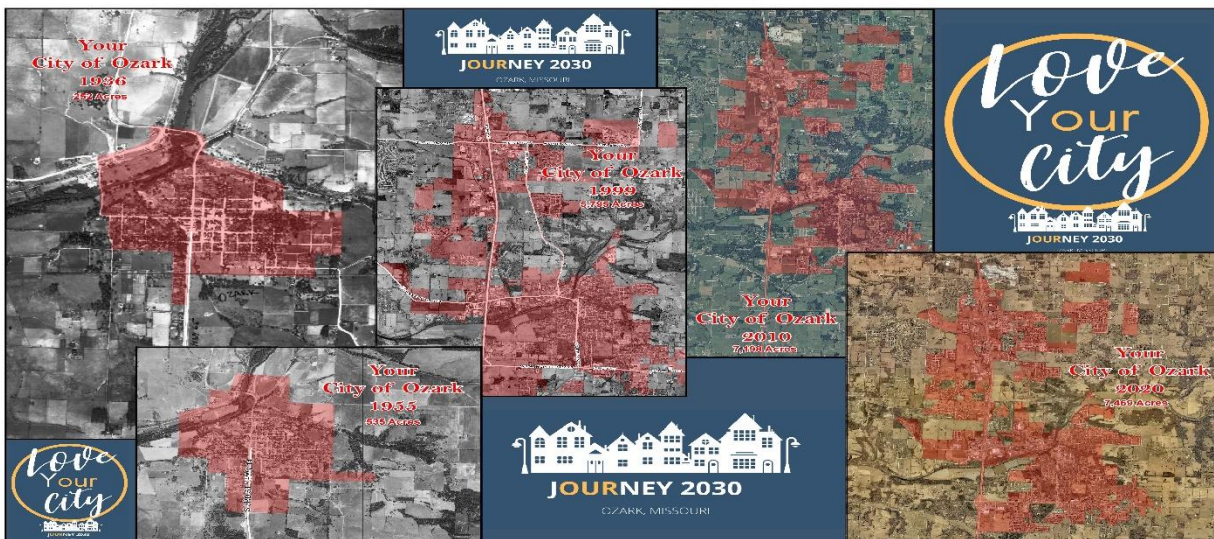


Figure 2 - Aerial Images of Ozark's City Limits Expansion

EXISTING FACILITIES

NORTH 22nd STREET PLANT

The North 22nd Street Plant operates under Permit No. MO-0099163. The facility name listed on the operating permit is Ozark Wastewater Treatment Facility. The North 22nd Street Plant receives flow from all areas north of Finley River, the “old downtown” region, and areas north of Business Highway 65 (South Street). Per the MoDNR operating permit, the plant has a design flow of 2.1 MGD and an actual dry weather flow of 1.271 MGD. All flow tributary to the North 22nd Street Plant is pumped by the Fasco Lift Station, OTC Lift Station, or Pro Realty Lift Station with the majority of flow coming from the Fasco Lift Station. The original facility was constructed in the early 1980's. The south oxidation ditch and clarifiers were constructed to expand treatment capacity in 2009. An aerial image of the North 22nd Street Plant with the treatment components labeled is shown below.



Figure 3 - Aerial Image of North 22nd Street Plant

The North 22nd Street Wastewater Treatment Plant consists of headworks building, oxidation ditches, pump stations, clarifiers, sludge storage, sludge handling, sludge drying beds, tertiary filters, and UV disinfection. After the headworks building, the treatment plant is split into a north and south section until the tertiary filters. The plant is designed to provide biological nutrient removal through the use of anaerobic selectors and chemical addition in the final clarifiers. This section further covers the operation process of the treatment plant.

Influent/Headworks

Influent for the treatment plant is received from the Fasco lift station, Pro Realty lift station and OTC Lift Station. Influent is piped into the headworks building. The Headworks building includes a mechanical screen with a manual screen by-pass. The headworks includes a grit removal. Effluent from the headworks building is then piped to the anaerobic selector. The treatment plant also has the ability to store high flows through the use of a flow equalization basin.

Anaerobic Selector Basin

The treatment plant has two (2) existing selector basins. One for the north oxidation ditch and one for the south oxidation ditch. Both selector basins are three (3) chambers. Return Activated Sludge enters the anaerobic selector basin in Mixer #1. Water from the headworks building enters the anaerobic selector basin in Mixer #2. Following the two mixers, water enters Mixer #3 and then flows into the oxidation ditch.

Oxidation Ditch

The north oxidation ditch consists of an Orbital® process and is part of the original treatment facility. The south oxidation ditch was added during a subsequent upgrade and consists of brush aerators.

Secondary Clarifier

The treatment plant has four (4) clarifiers, two (2) for each side. Clarifiers consist of scum baffle and a sludge withdrawal header. Effluent from the clarifiers is piped through a gravity main to the tertiary filters. Scum is pumped from the separate scum pump stations to one of the sludge storage tanks. While the return activated sludge (RAS) and waste activated sludge (WAS) from the clarifiers is piped to the sludge lift station and splitter box. Alum is added to the secondary clarifier for phosphorous removal.

RAS/WAS Lift Station & Splitter Box

The two (2) RAS/WAS lift stations have similar designs. The RAS is pumped from both lift stations back to the influent selector basin. While the WAS is pumped to the sludge feed basin and sludge storage. The two (2) splitter boxes equally divide effluent from the aeration basins to the secondary clarifiers.

Sludge & Solids Handling

The sludge handling process consists of a sludge feed basin, solids handling building, sludge storage basins, waste sludge pump station, and sludge unloading station. The WAS is pumped from both plants to the sludge feed basin, then pump to the solids handling building and processed through a gravity belt thickener prior to sludge storage. Sludge is then processed through the loading station for final disposal.

Effluent

The effluent processes consist of tertiary filters, UV disinfection, effluent aeration, and effluent metering.

Effluent permit limits for the North 22nd Street Plant are listed below.

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/weekday***	24 hr. total
Biochemical Oxygen Demand ₅	mg/L		15	10	once/week	composite**
Total Suspended Solids	mg/L		20	15	once/week	composite**
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	3.6 12.1		1.5 2.7	once/week	grab
<i>E. coli</i> (Note 1, Page 4)	#/100mL		630	126	once/week	grab
Total Phosphorus	mg/L	*		0.5	once/week	grab

Figure 4 – Effluent Permit Limits for North 22nd Street Plant

Permit limits are met via the extended aeration process, ultra violet (UV) disinfection, and chemical addition for phosphorous removal. Sludge is hauled by the Owner and land applied.

ELK VALLEY PLANT

The Elk Valley WWTF operates under Permit No. MO-0133671. The Elk Valley Plant receives flow from all areas south of Business Highway 65 (South Street). Per the MoDNR operating permit, the plant has a design flow of 1.0 MGD and an actual dry weather flow of 164,850 GPD. All flow tributary to the Elk Valley Plant is conveyed via approximately 17,000 lineal feet of 30-inch diameter gravity sewer. A lift station located at the plant pumps flows into the plant. The facility was constructed in 2009. An aerial image of the Elk Valley Plant with the treatment components labeled is shown below.

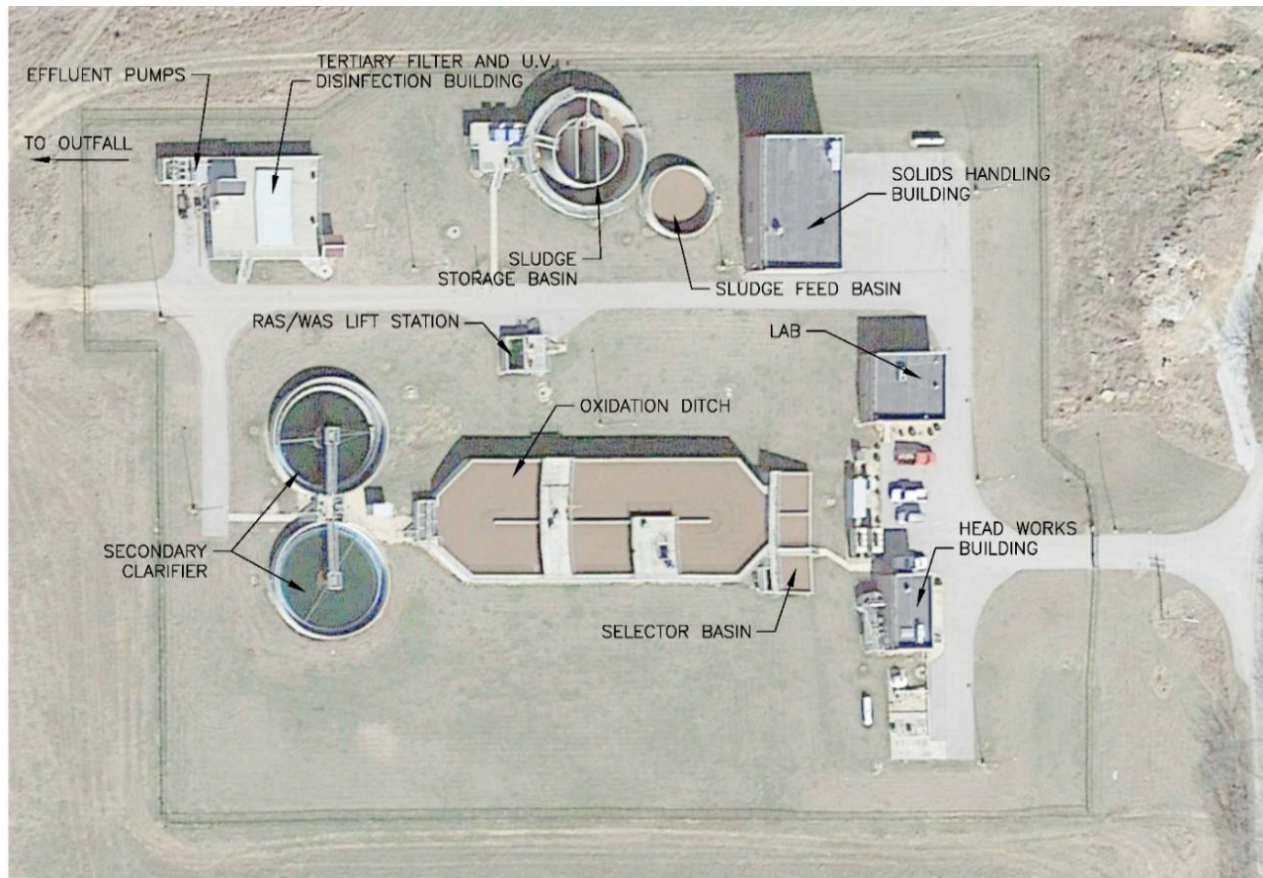


Figure 5 - Aerial Image of Elk Valley Plant

Elk Valley Wastewater Treatment Plant (WWTP) consists of lift stations, headworks, aeration basin, clarifier, sludge storage, tertiary filters, and UV disinfection. The plant is designed to provide biological nutrient removal through the use of an anaerobic selector and chemical addition in the final clarifiers. This section discusses the process and equipment in further depth.

Influent

Raw wastewater enters the lift station wet well through a 30-inch diameter pipe. Raw wastewater is screened through a trash basket. Influent is pumped into the treatment plant using three (3) raw water pumps with provisions to add a fourth pump in the future. Water is pumped through a 16-inch diameter force main with a flow meter into the headworks building.

Headworks

System headworks consist of bar screen and grit removal. There are two (2) bar screens in the headworks building. The primary bar screen is a mechanically cleaned and includes a manual bar screen

by-pass. Following the bar screen, wastewater flows through vortex grit removal system. Excess grit is processed through a grit concentrator. After the grit drive and concentrator, the headworks discharges through a 20-inch diameter pipe to the anaerobic selector basin. The headworks building also has a 4-inch drain pipe which returns water to the influent lift station. Between the headworks and influent lift station there is an odor control facility with vent to atmosphere.

Aeration Basin

The Aeration Basin consist of one (1) oxidation ditch with room to expand to two (2) oxidation ditches in the future. Return Activated Sludge enters the anaerobic selector basin in Mixer #1. Water from the headworks building enters the anaerobic selector basin in Mixer #2. Following the two mixers, water enters Mixer #3 and then flows into the oxidation ditch. The single oxidation ditch consists of one (1) low speed mixer and three (3) brush aeration rotors. The aeration basin discharges through an 18-inch diameter pipe to two (2) secondary clarifiers.

Secondary Clarifier

The system has two (2) round clarifiers with room for expansion to three (3) clarifiers in the future. Clarifiers consist of a scum trough and sludge manifold. After the secondary clarifier water discharges through 16-inch diameter pipe into the tertiary filters. Sludge from the secondary clarifiers is piped through a 12-inch diameter pipe to the Return Activated Sludge (RAS) and Waste Activated Sludge (WAS) lift station. Scum from the secondary clarifiers is piped through 3-inch diameter pipe to the sludge storage basin. Poly Aluminum Chloride (PAC) is added to the secondary clarifier for phosphorous removal.

RAS/WAS Lift Station

The lift station pumps RAS through a 12-inch diameter pipe and flow meter back to the anaerobic selector basin. The WAS is pumped through a 4-inch pipe, with a flow meter, to the sludge storage basin and sludge feed basin. The lift station has two (2) existing RAS pumps with provisions to add a third and one (1) WAS pump.

Sludge

The facility's sludge process consists of a sludge feed basin, solids handling building, sludge storage basin, blowers, odor control, sludge pump station, and sludge loading station. Under normal operation, sludge is pumped to the sludge feed basin, then pumped to the solids handling building for thickening through a belt thickener. Thickened sludge is then pumped to the sludge storage basin which contains aeration and a dissolved oxygen (DO) probe. Sludge from the storage basin is piped to the sludge loading pump station for final disposal. Each of the processes has the ability to be by-passed in order to provide maintenance.

Effluent

The effluent process consists of tertiary filters, UV disinfection, and effluent aeration and lift station. There are currently two (2) Tertiary Filters with room to expand to three (3) in the future. The effluent from the tertiary filters flows into UV disinfection before being pumped to the outfall. The effluent pump station consists of low profile post aeration and two (2) effluent pumps. Non-potable water is pumped to several locations within the plant.

Effluent permit limits for the Elk Valley Plant are listed below.

EFFLUENT PARAMETER(S)	UNITS	INTERIM EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/day	24 hr. estimate
Biochemical Oxygen Demand ₅	mg/L		15	10	once/week	composite**
Total Suspended Solids	mg/L		20	15	once/week	composite**
<i>E. coli</i> (Note 1, Page 4)	#/100mL		630	126	once/week	grab
Ammonia as N						
(March 1 – May 31)	mg/L	7.7		3.9	once/week	grab
(June 1 – August 31)		3.7		1.9		
(September 1 – November 30)		7.7		3.9		
(December 1 – February 28)		8.7		4.3		
Total Phosphorus	mg/L	*		0.5	once/week	grab
Total Nitrogen	mg/L	*		*	once/week	grab
Aluminum, Total Recoverable (Note 2, Page 3)	µg/L	*		*	once/month	grab
Iron, Total Recoverable (Note 2, Page 3)	µg/L	*		*	once/month	grab

Figure 6 - Effluent Permit Limits for the Elk Valley Plant

Permit limits are met via the extended aeration process, ultra violet disinfection, and chemical addition for phosphorous removal. Sludge is hauled by the Owner and land applied.

COLLECTION SYSTEMS

The City of Ozark sanitary sewer collection and conveyance system consists of approximately 126.7 miles of gravity sewer mains, 10.3 miles of force mains and 19 lift stations. Flow is conveyed to the North 22nd Street Wastewater Treatment Plant by utilizing 18 lift stations and one inverted siphon. All flow tributary to the North Plant is conveyed via the Fasco Lift Station, OTC Lift Station, and Pro Realty Lift Station. Flow is conveyed to the Elk Valley Wastewater Treatment Plant primarily through gravity sewer mains. The Plant is dosed via an onsite lift station. An inventory of the City's collection system follows:

Table 2: Inventory of the City's Collection System

ITEM	QUANTITY (Lineal Feet)
6-Inch Sanitary Sewer	1,206
8-Inch Sanitary Sewer	558,072
10-Inch Sanitary Sewer	28,589
12-Inch Sanitary Sewer	26,378
14-Inch Sanitary Sewer	806
15-Inch Sanitary Sewer	2,639
18-Inch Sanitary Sewer	4,478
21-Inch Sanitary Sewer	7,948
24-Inch Sanitary Sewer	19,225
27-Inch Sanitary Sewer	1,177
30-Inch Sanitary Sewer	17,559
Force Mains (Various Sizes)	54,114
Manholes	3,184

Fasco Lift Station

The Fasco Lift Station is the City's largest lift station. It is located off of N. 18th Street south of the old Fasco Plant. The lift station currently receives wastewater from the Lambert's Lift Station, Shop Lift Station, the Siphon and direct residential and commercial gravity flow. Approximately 1,303 residential homes/apartments and 215 non-residential properties gravity flow directly to the lift station.

The Fasco Lift Station is a triplex lift station housing three (3) 100 HP, 2,000 gpm Hydromatic brand pumps. The wet well is twenty-two feet long, twenty-three feet wide and twenty-four feet deep (22'x23'x24'). There is one (1) thirty-inch (30") diameter inlet pipe located three feet (3') from the bottom of the lift station's floor. A twelve-inch (12") diameter force main conveys wastewater from the lift station to the North 22nd Street WWTP. A Generac diesel generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 was out of service for a portion of this period. Pump 1 had an average run time of 0.87 hours per day. Pump 2 had an average run time of 2.71 hours per day. Pump 3 had an average run time of 3.97 hours per day. Based on the run time data, the existing average daily flow is 906,000 gallons per day (gpd) or 629.17 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Pro Realty Lift Station

The Pro Realty Lift Station address is 375 N. 21st Street and is accessed from W. Brick Street just west of the American Inn. The lift station currently only receives wastewater from gravity sewer mains. Approximately 587 residential homes and 56 commercial properties gravity flow to the lift station.

The Pro Realty Lift Station is a triplex lift station housing three (3) 15 HP, 700 gpm Hydromatic brand pumps. The wet well is twelve feet long, eight feet wide and fourteen feet deep (12'x8'x14'). A twelve-inch (12") diameter force main conveys wastewater from the lift station to the North 22nd Street WWTP. A Katolight propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.67 hours per day. Pump 2 has an average run time of 0.44 hours per day. Pump 3 has an average run time of 0.78 hours per day. Based on the run time data, the existing average daily flow is 79,380 gpd or 55.13 gpm. Appendix O shows the pump average run times based on the first and last hour counter reading.

Ozark Technical Community College (OTC) Lift Station

The OTC Lift Station is located on the north side of McCauley Road approximately 230 feet west of the intersection of 32nd Street and McCauley Road. The lift station currently receives wastewater from the Kali Springs Lift Station and direct residential and commercial gravity flow. Approximately 292 residential homes and 13 commercial properties gravity flow directly to the lift station.

The OTC Lift Station is a triplex lift station housing three (3) 50 HP Hydromatic brand pumps. The wet well is ten feet long, ten feet wide and twenty-one feet deep (10'x10'x21'). A twelve-inch (12") diameter force main conveys wastewater from the lift station to the North 22nd Street WWTP. A 100 kW Olympian D100P1 diesel generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City of Ozark performed a drawdown test in March 2018. The test determined Pump 1 has a pumping rate of 982 gpm, Pump 2 has a pumping rate of 864 gpm and Pump 3 has a pumping rate of 875 gpm. The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.50 hours per day. Pump 2 has an average run time of 0.84 hours per day. Pump 3 has an average run time of 0.55 hours per day. Based on the run time data, the existing average daily flow is 101,881 gpd or 70.75 gpm. Appendix O shows the pump average run times based on the first and last hour counter reading.

Lamberts Lift Station

The Lamberts Lift Station is the City's second largest lift station. It is located off of W. Boat Street northwest of The Home Brewery. The Lift Station currently receives wastewater from the Campbell City Lift Station, Grand Haven Lift Station, McGuffey Lift Station, Petrus Lift Station, Rapid Robert's Lift Station, The Rivers Lift Station, Shanaclaire Lift Station, West Elementary Lift Station and direct residential and commercial gravity flow. Approximately 1,643 residential homes and 170 commercial properties gravity flow directly to the lift station.

The Lamberts Lift Station is a triplex lift station housing three (3) 75 hp, 1,500 gpm Hydromatic brand pumps. The wet well is eighteen feet long, thirteen feet wide and twenty-five feet deep (18'x13'x25'). A sixteen-inch (16") diameter force main conveys wastewater from the lift station to a gravity sewer main that terminates at the Fasco Lift Station. A 150-kilowatt (kW) Generac Diesel generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 was out of service for a portion of this period. Pump 1 had an average run time of 2.75 hours per day. Pump 2 had an average run time of 3.19 hours per day. Pump 3 had an average run time of 1.88 hours per day. Based on the run time data, the existing average daily flow is 703,800 gallons per day (gpd) or 488.75 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Shop Lift Station

The Shop Lift Station is located on the west side of 3rd Street just south of the 3rd Street and Riverside Road intersection. The Lift Station currently receives wastewater from the Barrington Springs Lift Station, Knoll Ridge Lift Station, Riverside Lift Station residential and commercial gravity flow. Approximately 918 residential homes/apartments and 21 non-residential properties gravity flow directly to the lift station. Clogging of the pumps is a repetitive issue.

The Shop Lift Station is a duplex lift station housing two (2) 5 hp, 800 gpm Hydromatic brand pumps. The wet well is eight feet (8') in diameter and twenty-four feet (24') deep. A twelve-inch (12") diameter force main conveys wastewater from the lift station to a gravity sewer main that terminates at the Fasco Lift Station. A Kohler natural gas generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 had an average run time of 3.61 hours per day. Pump 2 had an average run time of 2.08 hours per day. Based on the run time data, the existing average daily flow is 273,120 gallons per day (gpd) or 189.67 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

The Rivers Lift Station

The Rivers Lift Station is located in The Rivers Subdivision Phase 2 approximately 270 feet from the end of the cul-de-sac on E Pintail Drive. Approximately 210 residential homes/apartments and 1 non-residential property gravity flow directly to the lift station.

The Rivers Lift Station is a duplex lift station housing two (2) 7.5 HP, 257 gpm Flygt brand pumps. The wet well is eight feet (8') in diameter and 15 feet (15 ft.) deep. A six-inch (6") diameter force main conveys wastewater from the lift station to the Lamberts Lift Station. An Olympian propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 1.11 hours per day. Pump 2 has an average run time of 1.11 hours per day. Based on the run time data, the existing average daily flow is 34,232 gallons per day (gpd) or 23.77 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Rapid Roberts Lift Station

The Rapid Roberts Lift Station is located on the east side of North 23rd St. in front of the northwest corner of Lake Hills Church parking lot. Approximately 15 apartments and 11 non-residential properties gravity flow directly to the lift station.

The Rapid Roberts Lift Station is a duplex lift station housing two (2) 5 HP, 110 gpm Hydromatic brand pumps. The wet well is six feet (6') in diameter and eleven feet (11') deep. A four-inch (4") diameter force main conveys wastewater from the lift station to an 8-inch gravity main that flows to Lamberts Lift Station. An Olympian Propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 1.25 hours per day. Pump 2 has an average run time of 1.22 hours per day. Based on the run time data, the existing average daily flow is 16,302 gallons per day (gpd) or 11.32 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Campbell City Lift Station

The Campbell City Lift Station is located at the end of a gravel access road that runs along the West side of Farmer Branch Road across from Journagan Construction Co's entrance. Approximately 20 residential homes and 4 non-residential properties gravity flow directly to the lift station.

The Campbell City Lift Station is a duplex lift station housing two (2) 15HP, 200 gpm Hydromatic brand pumps. The wet well is six feet (6') in diameter and sixteen feet (16') deep. A six-inch (6") diameter force main conveys wastewater from the lift station to the Lamberts Lift Station. A Kohler generator is located on site to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.49 hours per day. Pump 2 has an average run time of 0.45 hours per day. Based on the run time data, the existing average daily flow is 11,280 gallons per day (gpd) or 7.83 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Grand Haven Lift Station

The Grand Haven Lift Station is located in the Grand Haven Subdivision on the south end of N. Newport Drive. Approximately 141 residential homes and no non-residential property gravity flow directly to the lift station.

The Grand Haven Lift Station is a duplex lift station housing two (2) 5 HP, 238 gpm Hydromatic brand pumps. The wet well is eight feet (8') in diameter and thirteen feet (13') deep. A six-inch (6") diameter force main conveys wastewater from the lift station to a gravity main that terminates at the Lamberts Lift Station. An Onan natural gas generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.65 hours per day. Pump 2 has an average run time of 0.57 hours per day. Based on the run time data, the existing average daily flow is 17,422 gallons per day (gpd) or 12.09 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Knoll Ridge Lift Station

The Knoll Ridge Lift Station is located on a gravel road on the west side of S 21st Avenue behind the residential home at 865 S 21st Avenue. Approximately 33 residential homes and no non-residential gravity flow directly to the lift station.

The Knoll Ridge Lift Station is a duplex lift station housing two (2) 15 HP, 115 gpm Myers brand pumps. The wet well is six feet (6') in diameter. A four-inch (4") diameter force main conveys wastewater from the lift station to a gravity main that terminates at the Shop Lift Station. A Kohler propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.66 hours per day. Pump 2 has an average run time of 0.63 hours per day. Based on the run time data, the existing average daily flow is 8,901 gallons per day (gpd) or 6.18 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Petrus Lift Station

The Petrus Lift Station is located approximately 150 feet south of the end of Calvin Drive. Approximately 211 residential homes/apartments and 3 non-residential properties gravity flow directly to the lift station.

The Petrus Lift Station is a duplex lift station housing two (2) 5 HP, 260 gpm Hydromatic brand pumps. The wet well is 8 feet (8') in diameter and 13 feet (13') deep. A six-inch (6") diameter force main conveys wastewater from the lift station to a gravity main that terminates at the Lamberts Lift Station. An Olympian propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 1.00 hours per day. Pump 2 has an average run time of 0.66 hours per day. Based on the run time data, the existing average daily flow is 25,896 gallons per day (gpd) or 17.98 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Barrington Springs Lift Station

The Barrington Springs Lift Station is located at the end of the gravel road off of the N. 19th Ave cul-de-sac. Approximately 113 residential homes and no non-residential properties gravity flow directly to the lift station.

The Barrington Springs Lift Station is a duplex lift station housing two (2) 7.5 HP, 126 gpm Myers brand pumps. The wet well is nine feet (9') in diameter and thirteen feet (13') deep. A four inch (4") diameter force main conveys wastewater from the lift station to a gravity main that terminates at the Shop Lift Station. A Generac propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.89 hours per day. Pump 2 has an average run time of 1.25 hours per day. Based on the run time data, the existing average daily flow is 16,178 gallons per day (gpd) or 11.24 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

West Elementary School Lift Station

The West Elementary School Lift Station is located on the east side of N Fremont Road just north of the Ozark West Elementary School. Approximately 110 residential homes and 23 non-residential properties gravity flow directly to the lift station.

The West Elementary School Lift Station is a duplex lift station housing two (2) 30 HP, 750 gpm Hydromatic brand pumps. The wet well is ten feet (10') in diameter and seventeen feet (17') deep. A ten-inch (10") diameter force main conveys the wastewater from the lift station to a gravity main that terminates at Lamberts Lift Station. A Kohler diesel generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.13 hours per day. Pump 2 has an average run time of 0.16 hours per day. Based on the run time data, the existing average daily flow is 13,050 gallons per day (gpd) or 9.06 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Kali Springs Lift Station

The Kali Springs Lift Station is located on the north side of W Trevor Trail just west of the community pool approximately 130 feet off of Fremont Road. Approximately 389 residential homes and no non-residential properties gravity flow directly to the lift station.

The Kali Springs Lift Station is a duplex lift station housing two (2) 60 HP, 441 gpm Hydromatic brand pumps. The wet well is seven feet long, seven feet wide and thirteen feet deep (7'x7'x13') with eight feet wide, twelve feet long and eight feet deep (8'x12'x8') overflow basin. A six-inch (6") diameter force main conveys the wastewater from the lift station to a gravity main that terminates at the OTC Lift Station. A Generac diesel generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.68 hours per day. Pump 2 has an average run time of 0.79 hours per day. Based on the run time data, the existing average daily flow is 38,896 gallons per day (gpd) or 27.01 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Shanaclaire Lift Station

The Shanaclaire Lift Station is located on the west side of N Pheasant Road, approximately 150' south of the N Pheasant Road and E Lloyd Street intersection. Approximately 98 residential homes and no non-residential properties gravity flow directly to the lift station.

The Shanaclaire Lift Station is a duplex lift station housing two (2) 15 HP, 514 gpm Myers brand pumps. The wet well is eight feet (8') in diameter and thirteen feet (13') deep. A ten-inch (10") diameter force main conveys wastewater from the lift station to a gravity main that terminates at the Lamberts Lift Station. An Olympian propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.22 hours per day. Pump 2 has an average run time of 0.30 hours per day. Based on the run time data, the existing average daily flow is 16,037 gallons per day (gpd) or 11.14 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Kimmons Lift Station

The Kimmons Lift Station is located at 804 S 17th St. This is approximately 1,000 feet north of the S 17th Street and W Robin Road Intersection. Approximately 341 residential homes and 14 non-residential properties gravity flow directly to the lift station.

The Kimmons Lift Station is a triplex lift station housing three (3) 20 HP, 515 gpm Hydromatic brand pumps. The wet well is ten feet long, seven feet wide and twenty feet deep (10'x7'x20'). A ten-inch (10") diameter force main conveys wastewater from the lift station to a gravity main that flows through the siphon and terminates at the Fasco Lift Station. A Kohler propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.18 hours per day. Pump 2 has an average run time of 0.42 hours per day. Pump 3 has an average run time of 0.23 hours per day. Based on the run time data, the existing average daily flow is 25,647 gallons per day (gpd) or 17.81 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

Riverside Lift Station

The Riverside Lift Station is located at 1775 N Riverside Road. This address is off of a gravel road in a field on the west side of N Riverside Rd behind the residence at 1755 N Riverside Road. The gravel road is approximately $\frac{1}{4}$ of a mile passed the Finley River Park. Approximately 93 residential homes and no non-residential properties gravity flow directly to the lift station. This station is susceptible to flooding during large storm events.

The Riverside Lift Station is a duplex lift station housing two (2) 7.5 HP, 210 gpm Hydromatic brand pumps. The wet well is five feet (5') in diameter wide and seventeen feet (17') deep. A six-inch (6") diameter force main conveys wastewater from the lift station to the Shop Lift Station. An Olympian propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.59 hours per day. Pump 2 has an average run time of 0.46 hours per day. Based on the run time data, the existing average daily flow is 13,230 gallons per day (gpd) or 9.19 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

McGuffey Lift Station

The McGuffey Lift Station is located at 3410 N 12th Street. There is an access road located between two residential houses. The access road is approximately 350 feet south of the N 12th Street and W Poplar Street. Approximately 307 residential homes and 4 non-residential properties gravity flow directly to the lift station.

The McGuffey Lift Station is a duplex lift station housing two (2) 20 HP, 425 gpm Hydromatic brand pumps. The wet well is six feet (6') in diameter and twenty-three (23') deep. A six-inch (6") diameter force main conveys wastewater from the lift station to a gravity main that terminates at Lamberts Lift Station. A Generac propane generator is located onsite to provide power during an outage. A map of the lift station's contributing area is located in Appendix P.

The City provided run time data for each pump from July 2017 to December 2018. Pump 1 has an average run time of 0.83 hours per day. Pump 2 has an average run time of 0.86 hours per day. Based on the run time data, the existing average daily flow is 43,095 gallons per day (gpd) or 29.93 gallons per minute (gpm). Appendix O shows the pump average run times based on the first and last hour counter reading.

10th Street Siphon

The 10th Street Siphon is located approximately 1,250 feet downstream of the W. Jackson Street Bridge. The siphon conveys flows from the "Old Downtown" area and Kimmons Lift Station under the Finley River. The siphon discharges to a gravity trunk sewer tributary to the Fasco Lift Station. Approximately 1,067 residential homes/apartments and 142 non-residential properties gravity flow directly to the siphon.

The siphon was constructed in the early 1980's. The siphon is approximately 235 lineal feet consisting of one (1) 8-inch diameter pipe and two (2) 10-inch diameter pipes. Concrete anchor blocks 4-feet long by 4-feet wide by 1.5-feet thick are constructed approximately 18-feet on center. A map of the siphon's contributing area is located in Appendix P.

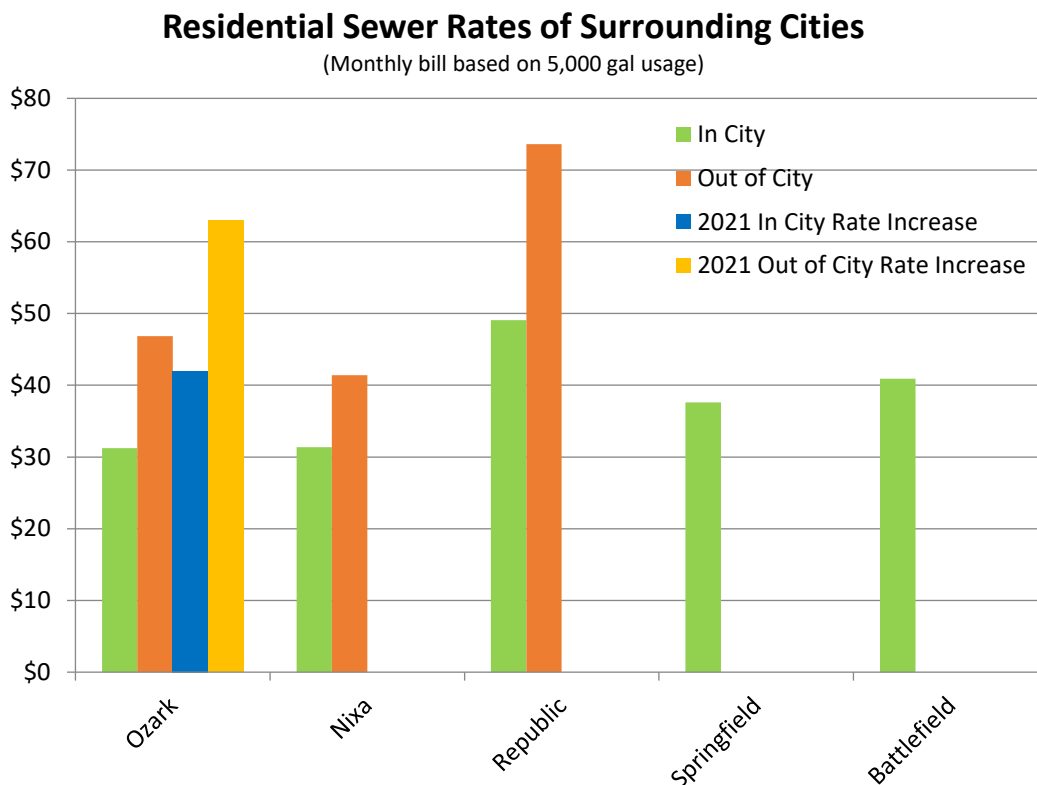
EXISTING RATES AND FEES

Sewer charges are calculated based on monthly water usage. Sewer rates inside the city limits are \$9.26 for the first 1,000 gallons and \$5.49 per 1,000 gallons thereafter. Monthly sewer bill for residents within city limits based on 5,000 gallons of usage is \$31.22. Sewer customers outside city limits are charged \$13.89 for the first 1,000 gallons and \$8.24 per 1,000 gallons thereafter. Monthly sewer bill for customers outside city limits based on 5,000 gallons of usage is \$46.85. The current residential sewer connection fee is \$2,115.85.

SEWER RATE INCREASE

A sewer rate increase was passed by the City Board of Aldermen on November 2, 2020. The increased sewer rates will be implemented on January 1, 2021. Sewer rates inside the city limits will be increased to \$10.00 for the first 1,000 gallons and \$8.00 per 1,000 gallons thereafter. Monthly sewer bill for residents within city limits based on 5,000 gallons of usage will be \$42.00. Sewer customers outside city limits will be charged \$15.00 for the first 1,000 gallons and \$12.00 per 1,000 gallons thereafter. Monthly sewer bill for customers outside city limits based on 5,000 gallons of usage will be \$63.00. The 2021 residential sewer connection fee will be \$2,266.56.

Residential sewer rates for neighboring communities are presented in the following table.



The table demonstrates that Ozark's "In City" rates are similar to Nixa's and lower than other surrounding cities prior to the 2021 rate increase being passed. In 2021 Ozark's "In City" rates will be slightly higher than Springfield and Battlefield's sewer rates but still lower than Republic's. Ozark's last sewer rate increase was in 2008. Rate increases were also implemented in 2000, 2003, 2005, and 2007. Prior to the 2003 rate increase, 5,000 gallons of usage yielded a \$10.68 sewer bill.

Rates should be based off the cost of service including operating and maintenance expenses, direct and indirect labor costs, capital improvement costs, debt service, and any other relevant expenses. The current and future financial status should be considered during rate reviews. Future usage projections, cost escalation factors, and future debt service all must be considered when determining a rate structure and rate increase schedule. In addition to maintaining a financially solid operation, cities face the challenge of providing sewer rates which are competitive with surrounding municipalities and districts.

IMPACT FEES

Undeveloped property, west of Highway 65, currently inside and outside the City Limits tributary to the North Treatment Plant was analyzed. At the time of the analysis, there were approximately 854 acres of undeveloped land inside City Limits and approximately 1,185 acres of undeveloped land outside City Limits. To provide adequate sized sewer services to these undeveloped areas, major Capital Improvements are required. The proposed improvements are listed in Category 4 and Category 8 under the Capital Improvements section. The estimated total cost for these improvements is \$3,073,213.

Existing developments in the City were reviewed to determine an approximate residential density. It was determined that approximately 2.5 lots can be developed per acre. Table 4 below shows the impact fee necessary to recuperate all funds utilized to construct these capital improvements.

Table 4: Impact Fees: West of Hwy 65 Capital Improvements

	Impact Fees Per Acre	Impact Fees Per Lot
Undeveloped Land inside City Limits (854 Acres)	\$3,599	\$1,439
Undeveloped Land Inside and Outside City Limits (2,039 Acres)	\$1,507	\$603

The impact fees did not account for commercial development. It only evaluated residential construction on the undeveloped land. Additional evaluation is necessary to determine impact fees for various zoning districts and development that has occurred since this analysis was performed.

AREAS OF KNOWN CONCERN

1) 12-INCH GRAVITY MAIN UNDER HIGHWAY 65

There is an existing 12-inch gravity sewer main under Highway 65 approximately 1,000 feet south of the Highway CC overpass. The City has reported this main surcharges upstream manholes as a result of being laid too flat. The West Elementary Lift Station, Rapid Roberts Lift Station, and Petrus Lift Station are all tributary to the crossing. Development fronting Highway 65 also gravity flows to the 12-inch crossing. The 12-inch crossing feeds into Lamberts Lift Station. Addition development tributary to the 12-inch Highway 65 crossing will further aggravate this problem.

2) 10th STREET SIPHON

The 10th Street Siphon conveys flows from the "Old Downtown" area under the Finley River. The siphon discharges to a gravity trunk sewer tributary to the Fasco Lift Station. The siphon creates operation and maintenances challenges. Siphons are notorious for sedimentation and blockages requiring routine flushing. In recent years erosion from flooding has left portions of the siphon uncovered. The City would like to see the siphon eliminated.

3) SURCHARGED GRAVITY MAIN EAST OF FASCO LIFT STATION

The gravity sewer main feeding into the Fasco Lift Station is prone to surcharging and SSO's during high flow events. The subject gravity sewer main receives flow from Lamberts Lift Station, Shop Lift Station, and the 10th Street Siphon. The upstream reaches of the main are 15-inch and 24-inch. The downstream segments are 27-inch. This area of the system is highly influenced by storm water inflow and infiltration which contributes to the hydraulic capacity issues. The tie-in configuration of the 18-inch gravity main from the north near The OC has also been identified as potentially effecting the hydraulic efficiency of the system. Flows of 1,500 gpm from Lamberts Lift Station are conveyed through the 18-inch gravity main. It should be noted the influence of inflow and infiltration experienced in this area will continue to be reduced through Cured in Place Pipe (CIPP) and cementitious lining projects.

4) PETRUS LIFT STATION CAPACITY

The Petrus Lift Station is located near the intersection of Petrus Circle and Calvin Drive. The Petrus Lift Station pumps to the 12-inch gravity main under Highway 65 and ultimately to the Lamberts Lift Station. Olde World Estates is a 125 acre residential development planned within the Petrus drainage basin. The development will have approximately 330 lots. The Petrus Lift Station has a pumping capacity of 260 gpm per pump. The lift station will likely need to be upgraded to serve full build out of Olde World Estates.

5) SHOP LIFT STATION CLOGGING

The Shop Lift Station is located near the intersection of W. Jackson Street and 3rd Street and has a pumping capacity of 800 gpm. The Shop Lift Station pumps into the gravity trunk sewer tributary to the Fasco Lift Station. The submersible pumps experience repeated clogging from debris and trash entering the lift station. Excessive maintenance is needed to keep this station operational. Clogging is experienced at lift stations throughout the system.

6) STORMWATER INFLOW AND INFILTRATION

Ozark's sanitary sewer system is heavily influenced by stormwater inflow and infiltration (I&I). Flows greater than five times the average daily flow have been experienced during storm events.

Stormwater enters sanitary sewer systems by two primary sources, inflow and infiltration. Inflow refers to stormwater that is directly connected to the sanitary sewer system. Sources of inflow consist of broken pipes in stream crossings, storm sewer connections, downspouts, sump pumps, manholes or cleanouts in low areas, etc. Infiltration refers to stormwater infiltrating the ground surface and entering the sanitary sewer system through cracked pipes, cracked manholes, failed pipe joints, failed manhole gaskets, etc.

While I&I is typical in older systems, the spikes in flow strain the collection system and treatment plants. Review of lift station pumping data indicates the majority of I&I is coming from the collection system tributary to the 10th Street Siphon. The "old downtown area" is tributary to the siphon. Flow spikes of a factor of ten have been observed in flow data analysis from this region of the system.

7) SCADA SYSTEM

The City's SCADA System software is no longer supported by the Manufacturer and needs updating. The City is also seeking out a reliable SCADA provider.

8) SLUDGE DISPOSAL

The City currently land applies sludge from both the North and Elk Valley Plants. Approximately 400 dry tons of sludge are land applied annually. EPA regulations under Title 40 Code of Federal Regulations Part 503 (40 CFR 503) establishes the minimum national standards for the use and disposal of domestic sludge. These standards include limitations for the land application of biosolids. MoDNR has incorporated the EPA standards into the state standards under the Missouri Clean Water Law and Regulations. These rules include additional requirements not covered in the EPA Standard.

Complying with state standards ensures compliance with the EPA sludge standards. State standards allow sludge to be land applied at a rate of 2 dry tons per acre. The City will need to retain 200 acres of suitable ground for land application of sludge. The City recognizes that development throughout the region is gradually reducing suitable sites to land apply sludge. The City has requested the Master Plan recommend a sludge drying process to alleviate the concerns associated with the long term feasibility of land application.

9) NORTH PLANT

- New addition does not work as well as the original plant
- The actuator valve does not work to automatically return or waste sludge. This is a manual process.
- Clarifiers are very labor intensive. The suction tubes are causing clogging.
- Slide gates at sludge return are extremely difficult to adjust. Telescoping tube like the Elk Valley plant works better and is more operator friendly.
- Digesters need more air. Potable water has to be added to it to increase the DO. Labor intensive and a waste of potable water.
- No emergency generator located at this facility.
- Grit Chamber is nearing end of life cycle.

10) ELK VALLEY PLANT

- The existing grit removal system has failed in the past causing overflows.

CAPITAL IMPROVEMENTS

Capital improvement recommendations will be divided into nine major categories:

- 1) Projects for Immediate Implementation
- 2) Inflow and Infiltration Project Programming
- 3) Treatment Facility Improvements
- 4) West of Highway 65 Collection/Conveyance Improvements Phase 1
- 5) South of Finley River Collection/Conveyance Improvements
- 6) Sludge Screw Press at Elk Valley Treatment Plant
- 7) Southside Septic Elimination
- 8) West of Highway 65 Collection/Conveyance Improvements Phase 2
- 9) 30-Year Treatment Planning

Each of these categories will be discussed in detail in the following sections.

1) PROJECTS FOR IMMEDIATE IMPLEMENTATION

Lift Station Flow Meters

To better aid in flow monitoring, installation of flow meters at the major lift stations is recommended. Flow meters should be installed at Lamberts Lift Station, Fasco Lift Station, OTC Lift Station, Pro Realty Lift Station, and Shop Lift Station. Flow meters should also be included with any new regional lift stations constructed in the future. Monitoring flow via flow meters will provide operators with more accurate data. The current flow data is determined by pump run times and estimated pump flow rates. Variable speed pumps, varying head conditions, and pump clogging can lead to inaccuracies in flow reporting. Electromagnetic flow sensors (Mag Meters) rated for raw sewage should be utilized. Mag Meters operate off the principle of Faradays Law of electromagnetic induction. Sensors in the meter converts flow into an electrical voltage proportional to the velocity of the flow.

Flow meters should be installed on the Lamberts Lift Station, Fasco Lift Station, OTC Lift Station, Pro Realty Lift Station, and Shop Lift Station. Through discussions with City staff, flow meter improvements will be implemented only when major lift stations require additional upgrades or modifications. Estimated cost to install flow meters on the five lift stations is \$111,000.

Lift Station Trash Baskets

Trash baskets should be installed on the systems major lift stations. While cleaning trash baskets will be an additional maintenance item, the superior performance of the lift stations will be of benefit to the City. Trash baskets should be installed on the Lamberts Lift Station, Fasco Lift Station, OTC Lift Station, Pro Realty Lift Station, and Shop Lift Station. Through ongoing discussions with City staff, installation of trash basket will only be implemented when major lift stations require additional upgrades or modifications. Estimated cost to install trash baskets on the five lift stations is \$105,000.

Riverside Lift Station Improvements

The Riverside Lift Station is susceptible to flooding from Finley River leading to significant direct storm water inflow. To combat this issue, sections will be added to the lift station wet well to raise the wet well top above flood elevation. This project was completed in April of 2020. The cost for improvements to the Riverside Lift Station was \$410,503. Improvements included upgrades to 3 phase power.

Elimination of The Rivers Lift Station

The City entered into a Cost Share Agreement with a developer to construct a 12-inch diameter gravity sewer from the intersection of West Black Street and Blue Stem Road to The Rivers existing lift station at 101 Pintail Drive. The new sewer main will be approximately 2,422 feet long. The existing lift will be

taken out of service once the new gravity sewer main is tested and placed in service. Construction is scheduled to be completed in 2021.

2) INFLOW AND INFILTRATION PROJECT PROGRAMMING

Ozark's sanitary sewer system is heavily influenced by stormwater inflow and infiltration (I&I). Flows greater than five times the average daily flow have been experienced during storm events.

Stormwater enters sanitary sewer systems by two primary sources, inflow and infiltration. Inflow refers to stormwater that is directly connected to the sanitary sewer system. Sources of inflow consist of broken pipes in stream crossings, storm sewer connections, downspouts, sump pumps, manholes or cleanouts in low areas, etc. Infiltration refers to stormwater infiltrating the ground surface and entering the sanitary sewer system through cracked pipes, cracked manholes, failed pipe joints, failed manhole gaskets, etc.

While I&I is typical in older systems, the spikes in flow strain the collection system and treatment plants. Review of lift station pumping data indicates the majority of I&I is coming from the collection system tributary to the 10th Street Siphon. The "old downtown area" is tributary to the siphon. Flow spikes of a factor of ten have been observed in flow data analysis from this region of the system.

To combat the stormwater influence on Ozark's collection system, the City should program and budget for annual Inflow and Infiltration Improvements. Cured-In-Place-Pipe and cementitious lining of manholes should be implemented on a strategic basis to reduce system infiltration. The areas to be targeted first should be deteriorating collection systems with clay pipe and brick manholes. Initial I&I efforts should be focused on the "old downtown" area. We estimate the total cost to line the downtown area mains and manholes at \$2.88 million. The City should allocate funds annually in the amount of \$300,000 to Inflow and Infiltration repairs. The \$300,000 annual allocation will allow the City to complete the downtown area Inflow and Infiltration repairs by 2030 (10 years). A detailed cost estimate (R-1) is located in Appendix R. In 2018, 1,606 lineal feet of 8-inch diameter pipe was lined with CIPP and 15 manholes had a cementitious liner installed. The total project cost was \$76,118. The City's 2019 rehabilitation project lined 353 manholes with a cementitious liner. The total project cost was \$356,554.40. The City's 2020 rehabilitation project lined 6,514 lineal feet of 8-inch diameter pipe with CIPP and 83 lateral service connections were rehabilitated. The total project cost was \$258,858.

Additionally, the City should take measures to remove downspouts and sump pump connections from the City sanitary sewer. Smoke testing is an effective method for locating illegal connections. Mains located at creek crossings should be inspected for failures allowing large quantities of surface water to enter the system.

3) TREATMENT FACILITY IMPROVEMENTS

North Plant

Sludge Return Structure Valve

The actuator valves which automatically open and close to either return or waste sludge from the clarifier have failed. Cochran is not recommending replacing actuators as they are prone to failure when located in a subsurface pit. Currently, the Operators have to enter the pit to open/close the valves. This is inconvenient but also can be dangerous entering/exiting during inclement weather. Cochran recommends removing the actuators and installing floor stand manual operators so entering the valve pit is not required. Estimated cost for the modification is \$24,245. A detailed cost estimate (R-2) is located in Appendix R.

Sludge Return Slide Gate

The return structures utilize a weir gate to adjust the flow from the clarifier to the sludge return pumps. The pumps either send the flow back to the aeration ditch or to sludge holding. The weir gate needs to be raised/lowered to match the rate of flow entering the clarifier. This process is very time consuming since there is not a method of determining the weir gate elevation in relation to the level in the clarifier. The Elk Valley WWTF uses a telescoping valve which has a means to determine valve height so it is very simple to adjust to match the clarifier flow. We recommend installing a similar telescoping valve at the North Plant. Estimated cost for the modification is \$16,250. A detailed cost estimate (R-3) is located in Appendix R.

Clarifier Equipment

Clarifiers #3 and #4 are approximately 22 years old and need major maintenance. Each clarifier currently has six suction tubes that remove sludge from the bottom of the clarifier. These tubes are prone to clogging preventing the sludge return from working properly. The clarifiers must be drained so the tubes can be cleaned. There is no means to improve this type of sludge return system. Upon further research this is a common problem with this type of sludge return system utilized in Clarifiers #3 and #4. The manufacturer is Walker Process Equipment.

Clarifiers #1 and #2 are also manufactured by Walker, but these utilize a different sludge removal system which works flawlessly. Clarifiers #1 and #2 were part of the upgrades to plant in 2007.

Walker was contacted about upgrades to Clarifier #3 and #4. According to Walker the units can be modified to utilize the new removal system but it is a pretty extensive process. For the same cost, the mechanical portion of the clarifier can be removed and replaced. Estimated cost per clarifier to replace the mechanical portion is \$275,000. A detailed cost estimate (R-4) is located in Appendix R.

Sludge Digester

The sludge holding basins utilize “coarse air diffusers” that do not provide adequate oxygen to the sludge. The Operator must add water to the sludge to increase the oxygen level in the sludge. The most energy efficient means of adding air to sludge is by “fine air diffusers”. Standard practice for using “fine air diffusers” is running for a period of time, then off for a period of time, then back on again. This uses half the electricity the “coarse air diffusers” use.

Through discussions with City staff, a better use of resources is to install a sludge screw press at the Elk Valley Treatment Plant instead of upgrading the sludge digester. It is anticipated in the next few years, land the City has been hauling and applying sludge on will no longer be available. This will require the City to find new adequate land and haul the sludge a much greater distance. The additional associated costs will make purchasing a sludge screw press and hauling the solids to a local landfill cost effective. The North Treatment Plant will continue to function as it is today, except no sludge will be stored at the plant. Sludge will be hauled from the North Plant to Elk Valley and stored there. The Sludge Screw Press is discussed further in Capital Improvements Section 6.

Grit Removal

The existing grit removal system is aging and nearing the end of its usable life cycle. City staff expressed a need for the grit removal system to be rehabilitated. The estimated cost to rehabilitate the grit removal system is \$350,000. A detailed cost estimate (R-5) is located in Appendix R.

Emergency Generator

Staff has requested an emergency generator be added at the North Plant. Cochran also recommends an emergency generator be installed to allow for plant operations during a power outage. Estimated cost for a 750kw generator and associated improvements is \$340,625. A detailed cost estimate (R-6) is located in Appendix R.

Elk Valley Plant

Grit Removal

The grit removal system is designed to operate on a timer and to run for five minutes. The grit classifier overflows when the grit pump runs for longer than two minutes. Per the original construction plans, the 6-inch diameter drain pipe from the grit classifier discharges in the 20-inch diameter influent pipe through a tee, not a wye. The tee is restricting the flow of the 6-inch diameter pipe. Using a wye would improve the hydraulic efficiency of the system and minimize the flow restriction. Through further discussions with City staff, the City can implement an inexpensive solution to the system.

4) WEST OF HIGHWAY 65 COLLECTION/CONVEYANCE IMPROVEMENTS PHASE 1

The purpose of the West of Highway 65 Improvements is to setup the sewage collection system to allow for new development and the associated additional sewage flows. These improvements redirect flows currently tributary to the Lamberts Lift Station ultimately to the OTC Lift Station. These improvements will provide sewer collection and conveyance capacity for future development of the region west of Highway 65. A breakdown of the phase 1 capital improvements follows.

Fremont Road Gravity Sewer Trunk Main Phase 1

This project consists of constructing 2,850 l.f. of large diameter gravity sewer trunk main generally along Fremont Road starting 700 feet south of Richwood Road and terminating west of the Kali Springs Lift Station. This phase will eliminate the Kali Springs Lift Station. The elimination of the Kali Springs Lift Station will eliminate flow through the Stonegate NID. Estimate cost for the Fremont Road Gravity Sewer Trunk Main Phase 1 is \$582,589. A detailed cost estimate (R-7) is located in Appendix R. The cost estimate presents the project in two phases. Phase 1 includes from Richwood Road to the Kali Springs Lift Station. Phase 2 will be discussed in more detail under the West of Highway 65 Collection/Conveyance Improvements Phase 2 section.

5) SOUTH OF FINLEY RIVER IMPROVEMENTS

The purpose of the South of Finley River Improvements is to redirect flow currently tributary to the 10th Street Siphon and flows from the Shop Lift Station. These flows will be redirected to the Elk Valley Treatment Plant. These improvements will eliminate the 10th Street Siphon, alleviate surcharging in the gravity sewer main east of Fasco Lift Station, increase utilization of the Elk Valley Treatment Plant, and free up capacity in the North 22nd Street Plant.

Finley River Lift Station and Force main to Elk Valley Plant

This project consists of constructing a new lift station south of Finley River near the 10th Street Siphon. The new Finley River Lift Station will ultimately eliminate the 10th Street Siphon and receive flow from the Shop Lift Station. The new Finley River Lift Station will pump to the Elk Valley Treatment Plant via approximately 23,000 lineal feet of large diameter force main. It is critical to reduce stormwater influence on the collection system tributary to the 10th Street Siphon prior to this project. Inflow and infiltration

improvements are recommended in a previous section of this report. Prior to re-routing these additional flows to the Elk Valley Treatment Plant a stormwater overflow basin shall be constructed at the Elk Valley Plant. The stormwater overflow basin will be needed to prevent hydraulic overload of the Elk Valley Plant during storm events. Estimated cost of the Finley River Lift Station and Force main is \$4,389,645. This estimate includes \$500,000 for the Elk Valley Treatment Plant Overflow Basin described later in this category. A detailed cost estimate (R-8) is included in Appendix R.

This project will eliminate the 10th Street Siphon and the associated operation and maintenance challenges.

This project will also alleviate surcharging of the gravity main east of the Fasco Lift Station.

Redirect Shop Lift Station to the New Finley River Lift Station

The Shop Lift Station should be redirected to the New Finley River Lift Station. This will require construction of 3,900 lineal feet of force main. Clogging of the Shop Lift Station is a common occurrence. Trash baskets should be added to the lift station to prevent clogging. Estimated cost for the Shop Lift Station Force main is \$578,266. A detailed cost estimate (R-9) is included in Appendix R.

This project will alleviate surcharging of the gravity main east of the Fasco Lift Station.

Elk Valley Treatment Plant Overflow Basin

A stormwater overflow basin should be constructed at the Elk Valley Treatment Plant. The overflow basin will be needed to store high flows experienced during storm events. The overflow basin should have a volume of 4 million gallons (535,000 cubic feet). A dry basin with a ponding depth of 6 feet and footprint of 2 acres would provide sufficient storage. It appears the City owns sufficient property to construct the basin while maintaining adequate property for future expansion of the plant. Consideration must be given to the floodplains impact on usable property at the Elk Valley Plant. Estimated cost of the Elk Valley Treatment Plan Overflow Basin is \$500,000. This cost is included in the Finley River Lift Station cost previously referenced in this report.

6) SLUDGE SCREW PRESS AT ELK VALLEY TREATMENT PLANT

The City currently utilizes large tracks of land to spread sludge. As development occurs the City will be unable to find the required acreage of land to land apply the biosolids. Over the past several years, the City has seen several pieces of property for sale that were formally land application sites. As the number of viable properties dwindle, the City must find replacement property typically further away. Per DNR regulations if a land application site is more than a 20 mile radius from the wastewater treatment facility, the City must get approval from the Department to use that site. A sludge screw press drastically reduces the amount of sludge produced at a wastewater treatment facility by dewatering the sludge. The dewatered sludge can be disposed of at a landfill or another approved method. The estimated cost of the sludge screw press is \$550,000.

7) SOUTHSIDE SEPTIC ELIMINATION

The purpose of the Southside Septic Elimination is to provide City sewer services to a large number of Ozark water customers and some Ozark residents currently on individual septic systems or septic tanks maintained by the City. The majority of the area are single family residential homes but there are some duplexes. These improvements will add customers to the City and eliminate individual septic systems that eventually fail and leach untreated sewage into the ground.

Phase 1

Phase 1 will provide City sanitary sewer service to Red Fern Estates, Cripple Creek and the 16th Avenue/Sherwood Court area. This phase includes approximately 9,600 l.f. of sanitary sewer main. The sanitary sewer main will be extended from existing infrastructure in the Windridge Subdivision. Approximately 103 existing houses will be connected to the City's sanitary sewer system. The cost estimate for Phase 1 is \$891,153. A detailed cost estimate (R-10) is located in Appendix R.

Phase 2

Phase 2 will provide City sanitary sewer service to Rainey Addition Subdivision. This is the subdivision located east of the new Elk Valley Estates currently under construction. This phase includes approximately 6,600 l.f. of sanitary sewer main. Approximately 51 existing houses will be connected to the City's sanitary sewer system. The cost estimate for Phase 2 is \$675,420. A detail cost estimate (R-11) is located in Appendix R.

8) WEST OF HIGHWAY 65 COLLECTION/CONVEYANCE IMPROVEMENTS PHASE 2

The purpose of the West of Highway 65 Improvements is to setup the sewage collection system to allow for new development and the associated additional sewage flows. These improvements redirect flows currently tributary to the Lamberts Lift Station ultimately to the OTC Lift Station. These improvements will provide sewer collection and conveyance capacity for future development of the region west of Highway 65. A breakdown of the capital improvements follows.

Fremont Road Gravity Sewer Trunk Main Phase 2

This project consists of constructing 5,150 l.f. of large diameter gravity sewer trunk main generally along Fremont Road starting just west of the Kali Springs Lift Station and terminating near the ridge of West Garton Road. This trunk main will ultimately serve as the receiving sewer for redirected flows from the Rapid Roberts Lift Station, Petrus Lift Station, West Elementary Lift Station and undeveloped surrounding properties. Estimated cost for the Fremont Road Gravity Sewer Trunk Main Phase 2 is \$788,014. A detailed cost estimate (R-7) is located in Appendix R. The cost estimate presents the project in two phases. Phase 2 includes from Kali Springs Lift Station to Garton Road.

Casey's Lift Station (Highway CC and Fremont Road)

This project consists of constructing a new lift station near the Casey's Gas Station at Highway CC and Fremont Road. Flows from the Rapid Roberts Lift Station, Petrus Lift Station, West Elementary Lift Station, upstream undeveloped properties will be directed to the new lift station. The new lift station will pump to the new Fremont Road Trunk Main via 4,000 lineal feet of force main. Estimated cost of the Casey's Lift Station and Force main is \$817,570. A detailed cost estimate (R-12) is included in Appendix R.

Gravity Sewer from Petrus Lift Station to Casey's Lift Station

As discussed in the "Areas of Known Concern" section of the report, the Petrus Lift Station lacks adequate capacity to serve the proposed 330 lots within Olde World Estates Subdivision. This project eliminates the Petrus Lift Station and associated capacity issues. Sewage tributary to the Petrus Lift Station will be conveyed to the Casey's Lift Station via 3,000 lineal feet of gravity sewer line. The 3,000 foot sewer line will be sized to serve future development within the drainage basin in addition to Olde World Estates. Estimated cost for the gravity sewer line from Petrus Lift Station to Casey's Lift Station is \$392,086. A detailed cost estimate (R-13) is included in Appendix R.

This project also alleviates surcharging of the 12-inch gravity sewer main under Highway 65 discussed in the "Areas of Known Concern" section of the report.

Redirecting flow from the Petrus Lift Station will free up capacity in the Lamberts Lift Station for future development.

The absorption rate of lots in Olde World Estates will be a driving factor in completing the West of Highway 65 Sanitary Sewer Collection Improvements. During plan review for Old World Estates – Phase 1, it was estimated the Petrus Lift Station has capacity to serve approximately 176 additional lots without lift station upgrades. An assumed absorption rate of 54 lots per year indicates the West of Highway 65 Sanitary Sewer Improvements need to be completed within three years (2022) if no upgrades are implemented at the Petrus Lift Station. Critical improvements include construction of the Fremont Road Gravity Sewer and construction of the Casey's Lift Station before this gravity sewer main can be constructed. The schedule for these projects is dependent on the absorption rate of lots in Olde World Estates, flows increases observed at Petrus Lift Station, the ability to obtain easements and additional development tributary to the Petrus Lift Station.

Redirect West Elementary Lift Station to Casey's Lift Station

The West Elementary Lift Station currently serves only the Ozark West Elementary School. As development occurs within the West Elementary Lift Station drainage basin, flow should be redirected to the Casey's Lift Station. This will require construction of 2,400 lineal feet of force main. Estimated cost of the West Elementary Force main is \$374,913. A detailed cost estimate (R-14) is included in Appendix R.

This project also alleviates surcharging of the 12-inch gravity sewer main under Highway 65 discussed in the "Areas of Known Concern" section of the report.

Redirecting flow from the West Elementary Lift Station will free up capacity in the Lamberts Lift Station for future development.

Redirect Rapid Roberts Lift Station to Casey's Lift Station

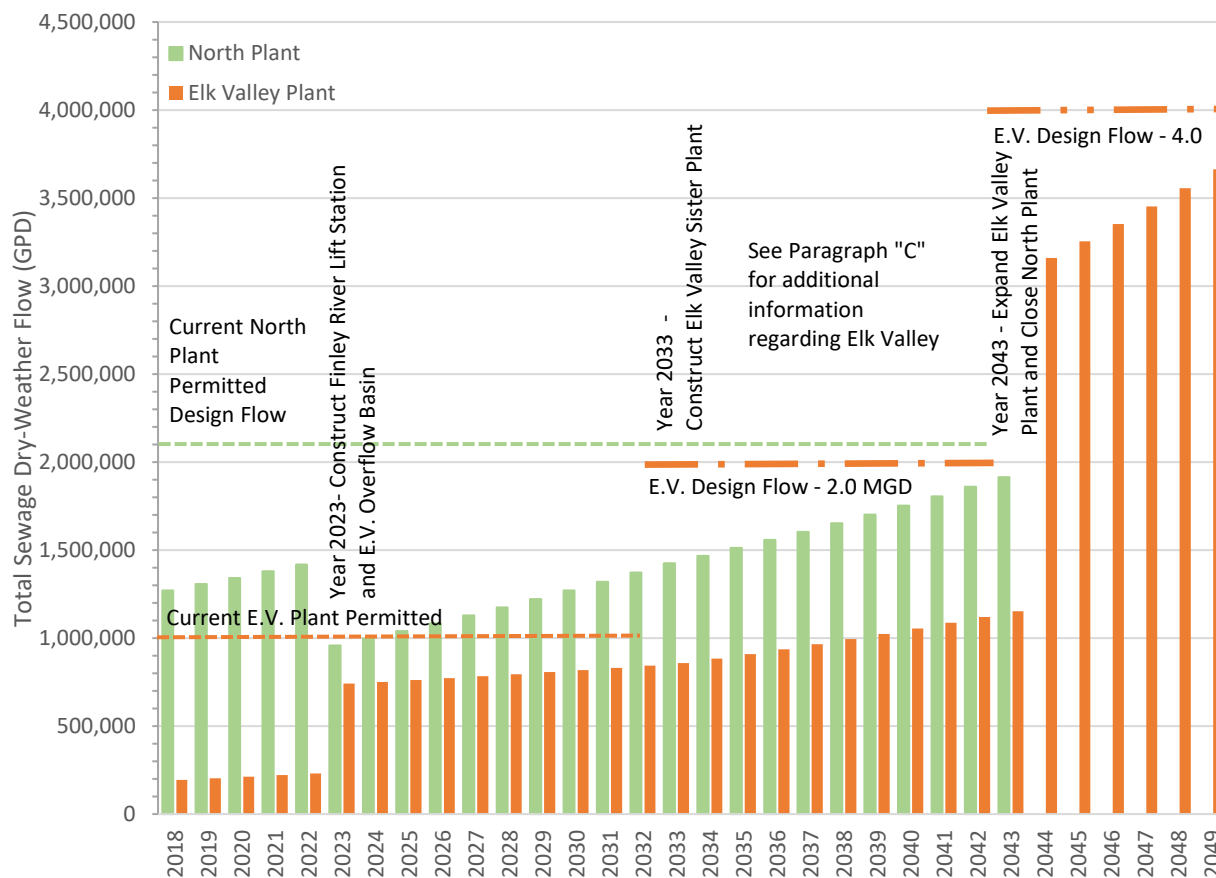
The Rapid Roberts Lift Station should be redirected to the Casey's Lift Station. This will require construction of 900 lineal feet of force main. Estimated cost for the Rapid Roberts Force main is \$118,040. A detailed cost estimate (R-15) is included in Appendix R.

This project also alleviates surcharging of the 12-inch gravity sewer main under Highway 65 discussed in the "Areas of Known Concern" section of the report.

Redirecting flow from the Rapid Roberts Lift Station will free up capacity in the Lamberts Lift Station for future development.

9) 30-YEAR TREATMENT PLANNING

Maintaining adequate treatment capacity is a critical component of the City's Master Plan. Preliminary discussions with the City indicate a desire to ultimately close the North Plant and consolidate all treatment to the Elk Valley Site. Reasons for closing the North Plant include limited property for expansion and odor issues. Implementing the Sludge Screw Press at Elk Valley is expected to reduce the odor issues currently being experienced. The previously discussed collection capital improvements are an integral piece of the long-term treatment plan. The following chart depicts future sewage flow projections and timing of capital improvements which impact capacity of the City's plants. Sewage flow projections are based on a 3% growth rate. Through the first 15 years of this evaluation we have assumed 80% of the growth will occur in areas tributary to the North Plant. The remaining 20% will occur in areas tributary to the Elk Valley Plant. These projections are reflective of development currently being experienced by Ozark. The final 15 years of the study period apply a non-weighted 3% growth rate to the entire Ozark service area.

Table 5: Future Sewage Flow Projections and Timing of Capital Improvements

- a) The first capital improvement listed on the table is the Finley River Lift Station and Elk Valley Overflow Basin. This project redirects flow from the 10th Street Siphon and Shop Lift Station to the Elk Valley Plant. This project is scheduled for 2023. The schedule allots time for the majority of the Downtown area inflow and infiltration improvements to be implemented. The Inflow & Infiltration Improvements are critical to efficiently diverting the additional flow to the Elk Valley Plant. The Finley River Lift Station projects diverts approximately 500,000 gpd to the Elk Valley Plant. The chart depicts the impact this has on each plants respective reserve capacity. If land application of sludge remains a concern at this point in time, a screw press should be installed during construction of the South Finley River Improvements. EPA regulations under Title 40 Code of Federal Regulations Part 503 (40 CFR 503) establishes the minimum national standards for the use and disposal of domestic sludge. These standards include limitations for the land application of biosolids. MoDNR has incorporated the EPA standards into the state standards under the Missouri Clean Water Law and Regulations. These rules include additional requirements not covered in the EPA Standard. Complying with state standards ensures compliance with the EPA sludge standards. State standards allow sludge to be land applied at a rate of 2 dry tons per acre. Actual timing of the screw press installation will be based off availability of land remaining for land application. Estimated cost for the screw press installation is \$550,000. Future sludge production should be re-evaluated to confirm screw press capacity.
- b) The second capital improvement project depicted on the chart is construction of a sister plant at Elk Valley. The sister plant will increase the Elk Valley Facility capacity to 2.0 MGD. Timing of

this project is driven by the existing Elk Valley Plant approaching its 1.0 MGD capacity. This project is scheduled for 2033 based on flow projections. Faster or slower growth in the areas tributary to the Elk Valley Plant may dictate an alternate schedule. Estimated cost of the 1.0 MGD sister plant is \$12 million.

- c) The third capital improvement project depicted on the chart is further expansion of the Elk Valley Plant and closure of the North Plant. This project will be a major undertaking and the largest capital expense outlay discussed in this report. The timing of this project is driven by the North Plant approaching its 2.1 MGD permitted capacity. Faster or slower growth rates within the area tributary to the North Plant may dictate an alternate schedule. The City's tolerance of the plant's odor concern will also impact the schedule. Implementing the Sludge Screw Press at Elk Valley and eliminating sludge being stored at the North Plant is expected to reduce the odor issues currently being experienced. Closure of the North Plant will require redirecting flows from the Fasco, Pro Realty, and OTC Lift Stations along with expansion of the Elk Valley Plant.

Expansion phasing of the Elk Valley Plant can be accomplished in various manners. Flow projections indicate expansion of the Elk Valley Plant will be required in 2033. Closing the North Plant and consolidating treatment will force a sizeable expansion to the Elk Valley Plant. Growth projections of 3% yield a total sewage flow of 3.56 MGD in year 2048. From year 2032 to 2048, Elk Valley's treatment capacity will need to be increased from 1.0 MGD to +/- 4.0 MGD. The City should anticipate expanding the Elk Valley Plant in phases. One possible scenario for the phased expansion of the Elk Valley Plant is presented in the above chart. This scenario depicts constructing a sister plant in year 2032 bringing the total plant capacity to 2.0 MGD. A second expansion would be constructed in year 2042 bringing the plants total capacity to 4.0 MGD. There may also be potential to phase redirecting flow from the North Plant to the Elk Valley Plant. This would preserve the treatment capacity of the North Plant and delay the need to expand the Elk Valley Plant beyond 2.0 MGD. Actual timing and phases of the Elk Valley expansions will be based on actual experienced population growth and growth locations, the City's prioritization of closing the North Plant, and the City's future economic outlook.

PRETREATMENT PROGRAM

As additional commercial businesses and industrial facilities build in the City of Ozark, development of a Pretreatment Program will identify guidelines for the types and levels of contaminants and flows that an industry can discharge to the municipal sewer system.

There are various reasons for implementing a Pretreatment Program, including the following:

- To prevent the introduction of pollutants into a Publicly Owned Treatment Works (POTW) that will interfere with the operation of the POTW, such as causing upsets that diminish the ability to properly treat the wastewater.
- To ensure that sludge can continue to be safely land applied.
- To prevent the formation of dangerous gases in the sanitary sewer system, which could be harmful to workers or the public or could cause corrosion or damage to the sewer infrastructure.
- To eliminate undesirable pollutants that could pass through the treatment process and cause threats to aquatic life, human recreation or other beneficial uses of the receiving stream.
- To maintain the watershed quality at a lower cost than upgrading municipal treatment processes to treat new pollutants that may be added from commercial or industrial sources.
- To reduce potential liability and/or violations associated with toxic chemicals in wastewater.

In establishing a Pretreatment Program, it is helpful to understand how a city can have the authority to dictate and enforce what an industry's discharge limits can be. The national regulatory authority for pretreatment programs is in 40 CFR Part 403 (including "Streamlining Rule" updates). Information on establishing a Pretreatment Program is presented in the guidance document prepared by the U.S. Environmental Protection Agency (EPA) entitled "Introduction to the National Pretreatment Program," dated June 2011. In Missouri, the Department of Natural Resources (DNR) is the approval authority for delegating control authority to cities and their POTWs. Missouri state law authorizing cities to issue and enforce pretreatment permits and general pretreatment regulations are presented in 10 CSR 20-6.100. Under the State's Pretreatment Program, a city's local limits are approved by the State of Missouri and the legal authority to implement is in the city ordinance. If the City is participating in the State's Pretreatment Program, DNR would be the Control Authority for industries in the categories listed in 10 CSR 20-6.100 and would be responsible for administering and enforcing pretreatment requirements through inspections, semi-annual IU reports, and annual compliance sampling.

Another option for a city is to establish local ordinances, but not participate in the State's program. This would provide requirements for industries that discharge into the municipal sewer system, without the DNR administrative/reporting requirements. In preparing the ordinance, the City should ensure the language establishes the legal authority and identifies enforcement provisions. For specific industries, the City can either establish a permitting process or include industry-specific requirements in the ordinance. By modeling the ordinance after those required for the State program, it will be easy to transfer into the State program if required in the future. Conditions which may require participation in the State-monitored pretreatment program include systems with combined POTWs flow greater than 5 million gallon per day (MGD) or specific findings of industrial pollutants having a negative impact on the wastewater treatment process.

Six minimum elements to be included in the Pretreatment Program, as identified in the "Introduction to the National Pretreatment Program" document, are as follows:

1. Legal Authority—Establish the legal authority which authorizes or enables the POTW to apply and enforce any pretreatment requirements.
2. Procedures—Develop and implement procedures to ensure compliance with pretreatment requirements, including:

- a. Identifying and locating all industrial users (IUs) subject to the pretreatment program
 - b. Identifying the character and volume of pollutants contributed by such users
 - c. Notifying users of applicable pretreatment standards and requirements
 - d. Receiving and analyzing reports from IUs
 - e. Sampling and analyzing IU discharges
 - f. Evaluating the need for IU slug control plans
 - g. Investigating instances of noncompliance
 - h. Complying with public participation requirements
3. Funding—Have sufficient resources and qualified personnel to carry out the authorities and procedures specified in its approved pretreatment program.
4. Local Limits—Develop local limits in defined circumstances or demonstrate why these limits are not necessary.
5. Enforcement Response Plan (ERP)—Develop and implement an ERP that contains detailed procedures indicating how the POTW will investigate and respond to instances of IU noncompliance.
6. List of Significant Industrial Users (SIUs)—Prepare, update and submit to DNR a list of all SIUs.

Various guidance documents are available to identify applicable pretreatment guidelines, including guidance from EPA and Industry-Specific guides. There are eight general categories of pollutant discharges that are forbidden:

- Discharges containing pollutants that create fire or explosion hazards
- Discharges containing pollutants that can cause corrosive structural damage (no discharge of pH lower than 5.0)
- Discharges of any pollutants in amounts causing obstruction to the flow
- Discharges with pollutants released at a flow rate or concentration that will cause interference with the POTW
- Discharges of heat in amounts that will inhibit biological activity
- Discharges of petroleum oil, non-biodegradable cutting oil or products of mineral oil origin in amounts that will cause interference or pass through
- Discharges that result in the presence of toxic gases, vapors or fumes that could cause acute worker health and safety problems
- Discharges of trucked or hauled pollutants, except at discharge points designated by the POTW.

In addition, industries with specific regulatory requirements are listed in 10 CSR 20-6.100. Local limits can be established to address the specific needs of the POTW, its sludge and receiving waters.

An initial step performed by the City would be to conduct an industrial waste survey, which would include identifying IUs that might be subject to the pretreatment program. Evaluations would be done of the character and volume of pollutants that may be contributed by these sources, as well as looking at other potential sources from other users in the system. Best management practices (BMPs) for certain industries are also taken into consideration. This information would be used in establishing the local ordinances and/or permits. The “EPA Model Pretreatment Ordinance”, July 2007, (www3.epa.gov/npdes/pubs/pretreatment_model_suo.pdf) provides some recommended language for developing the ordinance. Provisions for the six minimum elements listed above should be included in the local ordinance for the Pretreatment Program.

In identifying requirements to be included in the ordinance, consideration can be given to any potential waste stream or pollutant that may have a negative effect on the municipal wastewater collection and treatment system. For example, a meat packing process may generate wastewater with high levels of BOD. While the municipal system is designed to treat for BOD, very high levels or slugs of wastewater with high levels of BOD can upset the biological balance at the plant, which will affect the ability to meet

the effluent limitations required in the operating permit. Similarly, a process that generates large volumes of wastewater in slugs could upset the treatment plant balance, even if there are no pollutants of concern. Another example is for an industry with metals in their waste water, these metals could pass through the treatment and affect the environment below the discharge point or they could prevent the sludge from being able to meet the requirements for land application. By establishing a local Pretreatment Program, the City can protect its infrastructure and ensure that the treatment systems can be operated within the effluent limitations and guidelines provided in the operating permits.

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APPENDIX A
HISTORIC POPULATION DATA

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HISTORIC POPULATION DATA

YEAR	POPULATION	10 YR GROWTH RATE	ANNUAL GROWTH RATE
1930	885		
1940	961	8.59%	0.86%
1950	1,087	13.11%	1.31%
1960	1,536	41.31%	4.13%
1970	2,384	55.21%	5.52%
1980	2,980	25.00%	2.50%
1990	4,243	42.38%	4.24%
2000	9,665	127.79%	12.78%
2010	17,820	84.38%	8.44%
2015	19,120	7.30%	1.46%

APPENDIX B
POPULATION PROJECTION DATA

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PROJECTED POPULATION

YEAR	PROJECTED POPULATION	PROJ. GROWTH RATE	ADD'L RESID PER YR.
2015	19,120		
2016	19,694	3.00%	574
2017	20,284	3.00%	591
2018	20,893	3.00%	609
2019	21,520	3.00%	627
2020	22,165	3.00%	646
2021	22,830	3.00%	665
2022	23,515	3.00%	685
2023	24,221	3.00%	705
2024	24,947	3.00%	727
2025	25,696	3.00%	748
2026	26,467	3.00%	771
2027	27,261	3.00%	794
2028	28,078	3.00%	818
2029	28,921	3.00%	842
2030	29,788	3.00%	868
2031	30,682	3.00%	894
2032	31,602	3.00%	920
2033	32,551	3.00%	948
2034	33,527	3.00%	977
2035	34,533	3.00%	1,006
2036	35,569	3.00%	1,036
2037	36,636	3.00%	1,067
2038	37,735	3.00%	1,099
2039	38,867	3.00%	1,132
2040	40,033	3.00%	1,166
2041	41,234	3.00%	1,201
2042	42,471	3.00%	1,237
2043	43,745	3.00%	1,274
2044	45,058	3.00%	1,312
2045	46,409	3.00%	1,352
2046	47,802	3.00%	1,392
2047	49,236	3.00%	1,434
2048	50,713	3.00%	1,477

APPENDIX C
NORTH 22ND STREET WWTP OPERATING PERMIT

DRAFT

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0099163
Owner:	City of Ozark
Address:	P.O. Box 295, Ozark, MO 65721
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	Ozark Wastewater Treatment Facility
Facility Address:	301 North 22 nd Street, Ozark, MO 65721
Legal Description:	See Page 2.
UTM Coordinates:	See Page 2
Receiving Stream:	See Page 2.
First Classified Stream and ID:	See Page 2.
USGS Basin & Sub-watershed No.:	See Page 2.

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

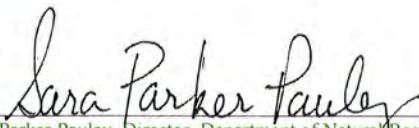
FACILITY DESCRIPTION

Outfall #001 – POTW – SIC #4952

See Page 2.

This permit authorizes only wastewater and stormwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 621.250 RSMo, Section 640.013 RSMo and Section 644.051.6 of the Law.

April 1, 2016
Effective Date


Sara Parker Pauley, Director, Department of Natural Resources

September 30, 2020
Expiration Date


John Madras, Director, Water Protection Program

FACILITY DESCRIPTION (continued):

Outfall #001 – POTW – SIC #4952

The use or operation of this facility shall be by or under the supervision of a Certified B Operator.

Mechanical bar screen / grit removal / flow splitter / flow is ran in parallel entering either; single cell aeration basin with anaerobic scale and two (2) clarifiers or three-cell aeration basin with anaerobic scale and two (2) clarifiers / chemical addition to facilitate phosphorus removal / tertiary cloth media filtration / ultraviolet disinfection / gravity belt thickener / three (3) aerated sludge holding tanks / sludge is land applied by the applicant.

Design population equivalent is 21,000.

Design flow is 2.1 MGD.

Actual flow is 1.2 MGD.

Design sludge production is 560 dry tons/year.

Legal Description:	NW ¼, NE ¼, Sec. 28, T27N, R21W, Christian County
UTM Coordinates:	X= 479096, Y= 4096879
Receiving Stream:	Finley Creek (P)
First Classified Stream and ID:	Finley Creek (P) (2352)
USGS Basin & Sub-watershed No.:	(11010002-0208)

Permitted Feature #SM1 – Instream Monitoring

Instream monitoring location – Upstream – See Special Condition #21.

OUTFALL #001	TABLE A-1. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS				PAGE NUMBER 3 of 11	
	PERMIT NUMBER MO-0099163					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on <u>April 1, 2016</u> , and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/weekday***	24 hr. total
Biochemical Oxygen Demand ₅	mg/L		15	10	once/week	composite**
Total Suspended Solids	mg/L		20	15	once/week	composite**
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	3.6 12.1		1.5 2.7	once/week	grab
<i>E. coli</i> (Note 1, Page 4)	#/100mL		630	126	once/week	grab
Total Phosphorus	mg/L	*		0.5	once/week	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>MAY 28, 2016</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
Aluminum, Total Recoverable (Note 2, Page 4)	µg/L	*		*	once/quarter *****	grab
Iron, Total Recoverable (Note 2, Page 4)	µg/L	*		*	once/quarter *****	grab
Total Nitrogen	mg/L	*		*	once/quarter *****	grab
Oil & Grease	mg/L	15		10	once/quarter *****	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JULY 28, 2016</u> .						
EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units ****	SU	6.0		9.0	once/week	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>MAY 28, 2016</u> .						

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

*** Once each weekday means: Monday, Tuesday, Wednesday, Thursday, and Friday.

**** pH is measured in pH units and is not to be averaged.

***** See table below for quarterly sampling requirements.

Minimum Sampling Requirements			
Quarter	Months	Oil & Grease and Total Nitrogen	Report is Due
First	January, February, March	Sample at least once during any month of the quarter	April 28 th
Second	April, May, June	Sample at least once during any month of the quarter	July 28 th
Third	July, August, September	Sample at least once during any month of the quarter	October 28 th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28 th

Note 1 - Effluent limitations and monitoring requirements for *E. coli* are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

Note 2 - If no Aluminum or Iron was used in a given sampling period, an actual analysis is not necessary. Simply report as "0 µg/L".

OUTFALL #001	TABLE A-2. WHOLE EFFLUENT TOXICITY FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS					
	The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on April 1, 2016 , and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:					
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Acute Whole Effluent Toxicity (Note 3)	TU _a	*			once/year	composite**
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2016</u> .						
Chronic Whole Effluent Toxicity (Note 4)	TU _c	*			once/permit cycle	composite**
<u>WET TEST</u> REPORTS SHALL BE SUBMITTED <u>ONCE PER PERMIT CYCLE</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2019</u> .						

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Note 3 – The Acute WET test shall be conducted once per year during the 1st, 2nd, and 4th year of the permit cycle. See Special Condition #24 for additional requirements.

Note 4 –The Chronic WET test shall be conducted during the 3rd year of the permit cycle. See Special Condition #25 for additional requirements.

TABLE B. INFLUENT MONITORING REQUIREMENTS			
The facility is required to meet a removal efficiency of 85% or more as a monthly average. The monitoring requirements shall become effective on April 1, 2016 , and remain in effect until expiration of the permit. To determine removal efficiencies, the influent wastewater shall be monitored by the permittee as specified below:			
SAMPLING LOCATION AND PARAMETER(S)	UNITS	MONITORING REQUIREMENTS	
		MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand ₅	mg/L	once/month	composite**
Total Suspended Solids	mg/L	once/month	composite**
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>MAY 28, 2016</u> .			

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

PERMITTED FEATURE #SM1	TABLE C. INSTREAM MONITORING REQUIREMENTS				PAGE NUMBER 5 of 11	
					PERMIT NUMBER MO-0099163	
The monitoring requirements shall become effective on <u>April 1, 2016</u> , and remain in effect until expiration of the permit.						
PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Total Phosphorus	mg/L	*		*	once/quarter *****	grab
Total Nitrogen	mg/L	*		*	once/quarter *****	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JULY 28, 2016</u> .						

* Monitoring requirement only.

***** See table below for quarterly sampling requirements.

Minimum Sampling Requirements			
Quarter	Months	Total Nitrogen & Total Phosphorus	Report is Due
First	January, February, March	Sample at least once during any month of the quarter	April 28 th
Second	April, May, June	Sample at least once during any month of the quarter	July 28 th
Third	July, August, September	Sample at least once during any month of the quarter	October 28 th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28 th

D. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Parts I, II, & III standard conditions dated August 1, 2014, May 1, 2013, and March 1, 2015, and hereby incorporated as though fully set forth herein.

E. SPECIAL CONDITIONS

- This permit establishes final ammonia limitations based on Missouri's current Water Quality Standard. On August 22, 2013, the U.S. Environmental Protection Agency (EPA) published a notice in the Federal Register announcing of the final national recommended ambient water quality criteria for protection of aquatic life from the effects of ammonia in freshwater. The EPA's guidance, Final Aquatic Life Ambient Water Quality Criteria for Ammonia – Fresh Water 2013, is not a rule, nor automatically part of a state's water quality standards. States must adopt new ammonia criteria consistent with EPA's published ammonia criteria into their water quality standards that protect the designated uses of the water bodies. The Department of Natural Resources has initiated stakeholder discussions on how to best incorporate these new criteria into the State's rules. A date for when this rule change will occur has not been determined. Also, refer to Section VI of this permit's factsheet for further information including estimated future effluent limits for this facility. It is recommended the permittee view the Department's 2013 EPA criteria Factsheet located at <http://dnr.mo.gov/pubs/pub2481.htm>.
- This permit may be reopened and modified, or alternatively revoked and reissued, to:
 - Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
 - contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
 - controls any pollutant not limited in the permit.
 - Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
 - Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.

E. SPECIAL CONDITIONS (continued)

- (d) Incorporate the requirement to develop a pretreatment program pursuant to 40 CFR 403.8(a) when the Director of the Water Protection Program determines that a pretreatment program is necessary due to any new introduction of pollutants into the Publically Owned Treatment Works or any substantial change in the volume or character of pollutants being introduced. The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.
- 3. All outfalls must be clearly marked in the field. This does not include instream monitoring locations.
- 4. Permittee will cease discharge by connection to a facility with an area-wide management plan per 10 CSR 20-6.010(3)(B) within 90 days of notice of its availability.
- 5. Report as no-discharge when a discharge does not occur during the report period. For instream samples, report as No Flow if no stream flow occurs during the report period.
- 6. Water Quality Standards
 - (a) To the extent required by law, discharges to waters of the state shall not cause a violation of water quality standards rule under 10 CSR 20-7.031, including both specific and general criteria.
 - (b) General Criteria. The following general water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
 - (1) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
 - (2) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
 - (3) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
 - (4) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
 - (5) There shall be no significant human health hazard from incidental contact with the water;
 - (6) There shall be no acute toxicity to livestock or wildlife watering;
 - (7) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
 - (8) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.
- 7. Changes in existing pollutants or the addition of new pollutants to the treatment facility

The permittee must provide adequate notice to the Director of the following:

 - (a) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; and
 - (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
 - (c) For purposes of this paragraph, adequate notice shall include information on;
 - (1) the quality and quantity of effluent introduced into the POTW, and
 - (2) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.
- 8. Reporting of Non-Detects:
 - (a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
 - (b) The permittee shall not report a sample result as "Non-Detect" without also reporting the detection limit of the test. Reporting as "Non Detect" without also including the detection limit will be considered failure to report, which is a violation of this permit.
 - (c) The permittee shall provide the "Non-Detect" sample result using the less than sign and the minimum detection limit (e.g. <10).
 - (d) The permittee shall use one-half of the detection limit for the non-detect result when calculating monthly averages.
 - (e) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.

E. SPECIAL CONDITIONS (continued)

9. It is a violation of the Missouri Clean Water Law to fail to pay fees associated with this permit (644.055 RSMo).
10. The permittee shall comply with any applicable requirements listed in 10 CSR 20-9, unless the facility has received written notification that the Department has approved a modification to the requirements. The monitoring frequencies contained in this permit shall not be construed by the permittee as a modification of the monitoring frequencies listed in 10 CSR 20-9. If a modification of the monitoring frequencies listed in 10 CSR 20-9 is needed, the permittee shall submit a written request to the Department for review and, if deemed necessary, approval.
11. The permittee shall develop and implement a program for maintenance and repair of the collection system. The recommended guidance is the US EPA's Guide For Evaluating Capacity, Management, Operation, And Maintenance (CMOM) Programs At Sanitary Sewer Collection Systems (Document number EPA 305-B-05-002) or the Departments' CMOM Model located at <http://dnr.mo.gov/env/wpp/permits/docs/cmom-template.doc>. For additional information regarding the Departments' CMOM Model, see the CMOM Plan Model Guidance document at <http://dnr.mo.gov/pubs/pub2574.htm>.

The permittee shall also submit a report to the Southwest Regional Office annually, by January 28th, for the previous calendar year. The report shall contain the following information:
 - (a) A summary of the efforts to locate and eliminate sources of excessive infiltration and inflow into the collection system serving the facility for the previous year.
 - (b) A summary of the general maintenance and repairs to the collection system serving the facility for the previous year.
 - (c) A summary of any planned maintenance and repairs to the collection system serving the facility for the upcoming calendar year. This list shall include locations (GPS, 911 address, manhole number, etc.) and actions to be taken.
12. Bypasses are not authorized at this facility unless they meet the criteria in 40 CFR 122.41(m). If a bypass occurs, the permittee shall report in accordance to 40 CFR 122.41(m)(3), and with Standard Condition Part I, Section B, subsection 2.b. Bypasses are to be reported to the Southwest Regional Office or by using the online Sanitary Sewer Overflow/Facility Bypass Application, located at: <http://dnr.mo.gov/modnrcag/> during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. Blending, which is the practice of combining a partially-treated wastewater process stream with a fully-treated wastewater process stream prior to discharge, is not considered a form of bypass. If the permittee wishes to utilize blending, the permittee shall file an application to modify this permit to facilitate the inclusion of appropriate monitoring conditions.
13. The facility must be sufficiently secured to restrict entry by children, livestock and unauthorized persons as well as to protect the facility from vandalism.
14. At least one gate must be provided to access the wastewater treatment facility and provide for maintenance and mowing. The gate shall remain closed except when temporarily opened by; the permittee to access the facility, perform operational monitoring, sampling, maintenance, mowing, or for inspections by the Department. The gate shall be closed and locked when the facility is not staffed.
15. At least one (1) warning sign shall be placed on each side of the facility enclosure in such positions as to be clearly visible from all directions of approach. There shall also be one (1) sign placed for every five hundred feet (500') (150 m) of the perimeter fence. A sign shall also be placed on each gate. Minimum wording shall be SEWAGE TREATMENT FACILITY—KEEP OUT. Signs shall be made of durable materials with characters at least two inches (2") high and shall be securely fastened to the fence, equipment or other suitable locations.
16. An Operation and Maintenance (O & M) manual shall be maintained by the permittee and made available to the operator. The O & M manual shall include key operating procedures and a brief summary of the operation of the facility.
17. An all-weather access road shall be provided to the treatment facility.
18. The discharge from the wastewater treatment facility shall be conveyed to the receiving stream via a closed pipe or a paved or rip-rapped open channel. Sheet or meandering drainage is not acceptable. The outfall sewer shall be protected against the effects of floodwater, ice or other hazards as to reasonably insure its structural stability and freedom from stoppage. The outfall shall be maintained so that a sample of the effluent can be obtained at a point after the final treatment process and before the discharge mixes with the receiving waters.

E. SPECIAL CONDITIONS (continued)

19. Land application of biosolids shall be conducted in accordance with Standard Conditions III and a Department approved biosolids management plan. Land application of biosolids during frozen, snow covered, or saturated soil conditions in accordance with the additional requirements specified in WQ426 shall occur only with prior approval from the Department.
20. Discharge Monitoring Reports
 - (a) All reports and results required to be submitted by the permit, excluding 24-hr. bypass reporting, must be submitted to the Department via the electronic Discharge Monitoring Report Submission System (eDMR). In regards to Standard Conditions Part I, Section B, #7, the eDMR data reporting system is the only Department approved reporting method for this permit.
 - (b) To access the eDMR data reporting system, use the following link in your web browser: <https://edmr.dnr.mo.gov/edmr/E2/Shared/Pages/Main/Login.aspx>.
21. Receiving Water Monitoring Conditions
 - (a) In the event that a safe, accessible location is not present at the location(s) listed, a suitable location can be negotiated with the Department. Samples should be taken at least four feet from the bank or from the middle of the stream (whichever is less) and 6-inches below the surface. The upstream receiving water sample should be collected at a point upstream from any influence of the effluent, where the water is visibly flowing down stream.
 - (b) When conducting in-stream monitoring, the permittee shall record observations that include: the time of day, weather conditions, unusual stream characteristics (e.g., septic conditions, algae growth, etc.), the stream segment (e.g., riffle, pool or run) from where the sample was collected. These observations shall be submitted with the sample results.
 - (c) Samples shall not be collected from areas with especially turbulent flow, still water or from the stream bank, unless these conditions are representative of the stream reach or no other areas are available for sample collection. Sampling should not be made when significant precipitation has occurred recently. The sampling event should be terminated and rescheduled if any of the following conditions occur:
 - If turbidity in the stream increases notably; or
 - If rainfall over the past two weeks exceeds 2.5 inches or exceeds 1 inch in the last 24 hours
 - (d) Always use the correct sampling technique and handling procedure specified for the parameter of interest. Please refer to the latest edition of Standard Methods for the Examination of Water and Wastewater for further discussion of proper sampling techniques. All analyses must be conducted in accordance with an approved EPA method. Meters shall be calibrated immediately (within 1 hour) prior to the sampling event.
 - (e) Please contact the Department if you need additional instructions or assistance.
22. Stormwater Pollution Prevention Plan (SWPPP): A SWPPP must be developed and implemented within 180 days of the effective date of the permit. Through implementation of the SWPPP, the permittee shall minimize the release of pollutants in stormwater from the facility to the waters of the state. The SWPPP shall be developed in consultation with the concepts and methods described in the following document: Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators, (Document number EPA 833-B-09-002) published by the United States Environmental Protection Agency (USEPA) in February 2009.
 - (a) The SWPPP must identify any stormwater outfall from the facility and Best Management Practices (BMPs) used to prevent or reduce the discharge of contaminants in stormwater. The stormwater outfalls shall either be marked in the field or clearly marked on a map and maintained with the SWPPP.
 - (b) The SWPPP must include a schedule and procedures for a once per month routine site inspection.
 - (1) The monthly routine inspection shall be documented in a brief written report, which shall include:
 - i. The person(s) conducting the inspection.
 - ii. The inspection date and time.
 - iii. Weather information for the day of the inspection.
 - iv. Precipitation information for the entire period since the last inspection.
 - v. Description of the discharges observed, including visual quality of the discharges (sheen, turbid, etc.).
 - vi. Condition of BMPs.
 - vii. If BMPs were replaced or repaired.
 - viii. Observations and evaluations of BMP effectiveness.
 - (2) Any deficiency observed during the routine inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
 - (3) The routine inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.

E. SPECIAL CONDITIONS (continued)

- (4) The routine inspection reports shall be made available to Department personnel upon request.
 - (c) The SWPPP must include a schedule and procedures for a once per year comprehensive site inspection.
 - (1) The annual comprehensive inspection shall be documented in a written report, which shall include:
 - i. The person(s) conducting the inspection.
 - ii. The inspection date and time.
 - iii. Findings from the areas of your facility that were examined.
 - iv. All observations relating to the implementation of your control measures including:
 - 1. Previously unidentified discharges from the site,
 - 2. Previously unidentified pollutants in existing discharges,
 - 3. Evidence of, or the potential for, pollutants entering the drainage system,
 - 4. Evidence of pollutants discharging to receiving waters at all facility outfall(s), and the condition of and around the outfall, and
 - 5. Additional control measures needed to address any conditions requiring corrective action identified during the inspection.
 - v. Any required revisions to the SWPPP resulting from the inspection;
 - vi. Any incidence of noncompliance observed or a certification stating that the facility is in compliance with Special Condition E.23.
 - (2) Any deficiency observed during the comprehensive inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
 - (3) The comprehensive inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
 - (4) The comprehensive inspection reports shall be made available to Department personnel upon request.
 - (d) The SWPPP must be kept on-site and should not be sent to the Department unless specifically requested.
 - (e) The SWPPP must be reviewed and updated at a minimum once per permit cycle, as site conditions or control measures change.
23. The permittee shall select, install, use, operate, and maintain the Best Management Practices prescribed in the SWPPP.
- (a) Permittee shall adhere to the following minimum Best Management Practices (BMPs):
 - (1) Minimize the exposure of industrial material storage areas, loading and unloading areas, dumpsters and other disposal areas, maintenance activities, and fueling operations to rain, snow, snowmelt, and runoff, by locating industrial materials and activities inside or protecting them with storm resistant coverings, if warranted and practicable.
 - (2) Provide good housekeeping practices on the site to prevent potential pollution sources from coming into contact with stormwater and provide collection facilities and arrange for proper disposal of waste products, including sludge.
 - (3) Implement a maintenance program to ensure that the structural control measures and industrial equipment is kept in good operating condition and to prevent or minimize leaks and other releases of pollutants.
 - (4) Prevent or minimize the spillage or leaks of fluids, oil, grease, fuel, etc. from equipment and vehicle maintenance, equipment and vehicle cleaning, or activities.
 - (5) Provide sediment and erosion control sufficient to prevent or control sediment loss off of the property. This could include the use of straw bales, silt fences, or sediment basins, if needed.
 - (6) Provide stormwater runoff controls to divert, infiltrate, reuse, contain, or otherwise minimize pollutants in the stormwater discharge.
 - (7) Enclose or cover storage piles of salt or piles containing salt, used for deicing or other commercial or industrial purposes.
 - (8) Provide training to all employees who; work in areas where industrial materials or activities are exposed to stormwater, are responsible for stormwater inspections, are members of the Pollution Prevention Team. Training must cover the specific control measures and monitoring, inspection, planning, reporting and documentation requirements of this permit. Training is recommended annually for any applicable staff and whenever a new employee is hired who meets the description above.
 - (9) Eliminate and prevent unauthorized non-stormwater discharges at the facility.
 - (10) Minimize generation of dust and off-site tracking of raw, final, or waste materials by implementing appropriate control measures.

E. SPECIAL CONDITIONS (continued)

24. Acute Whole Effluent Toxicity (WET) tests shall be conducted as follows:

SUMMARY OF ACUTE WET TESTING FOR THIS PERMIT					
OUTFALL	AEC	Acute Toxic Unit (TU _a)	FREQUENCY	SAMPLE TYPE	MONTH
001	100%	*	once/year	composite**	Any

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

DILUTION SERIES						
100%	50%	25%	12.5%	6.25%	(Control) 100% upstream, if available	(Control) 100% Lab Water, also called synthetic water

(a) Freshwater Species and Test Methods

- (1) Species and short-term test methods for estimating the acute toxicity of NPDES effluents are found in the most recent edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 48-hour static non-renewal toxicity tests with the following vertebrate species:
 - The fathead minnow, *Pimephales promelas* (Acute Toxicity Test Method 2000.0).
 And the following invertebrate species:
 - The daphnid, *Ceriodaphnia dubia* (Acute Toxicity Test Method 2002.0).
- (2) Chemical and physical analysis of an upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available, synthetic laboratory control water may be used.
- (3) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
- (4) Any and all chemical or physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% Effluent concentration in addition to analysis performed upon any other effluent concentration.
- (5) All chemical analyses shall be performed and results shall be recorded in the appropriate field of the report form. The parameters for chemical analysis include Temperature (°C), pH (SU), Conductivity (µmohs/cm), Dissolved Oxygen (mg/L), Total Residual Chlorine (mg/L), Un-ionized Ammonia (mg/L), Total Alkalinity (mg/L), and Total Hardness (mg/L).

(b) Reporting of Acute Toxicity Monitoring Results

- (1) WET test results shall be submitted to the Southwest Regional Office, or by eDMR, with the permittee's Discharge Monitoring Reports annually by **January 28, 2016**. The submittal shall include:
 - i. A full laboratory report for all toxicity testing.
 - ii. Copies of chain-of-custody forms.
 - iii. The WET form provided by the Department upon permit issuance.
- (2) The report must include a quantification of acute toxic units (TU_a = 100/LC₅₀) reported according to the test methods manual chapter on report preparation and test review. The Lethal Concentration, 50 Percent (LC₅₀) is the toxic or effluent concentration that would cause death in 50 percent of the test organisms over a specified period of time.

(c) Permit Reopener for Acute Toxicity

In accordance with 40 CFR Parts 122 and 124, this permit may be modified to include effluent limitations or permit conditions to address acute toxicity in the effluent or receiving waterbody, as a result of the discharge; or to implement new, revised, or newly interpreted water quality standards applicable to acute toxicity.

E. SPECIAL CONDITIONS (continued)

25. Chronic Whole Effluent Toxicity (WET) tests shall be conducted as follows:

SUMMARY OF CHRONIC WET TESTING FOR THIS PERMIT					
OUTFALL	AEC	Chronic Toxic Unit (TU _c)	FREQUENCY	SAMPLE TYPE	MONTH
001	100%	*	once/permit cycle	composite**	Any

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Dilution Series						
100%	50%	25%	12.5%	6.25%	(Control) 100% upstream, if available	(Control) 100% Lab Water, also called synthetic water

(a) Freshwater Species and Test Methods

- (1) Species and short-term test methods for estimating the chronic toxicity of NPDES effluents are found in the most recent edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 7-day, static, renewal toxicity tests with the following vertebrate species:
 - The fathead minnow, *Pimephales promelas* (Survival and Growth Test Method 1000.0).
 And the following invertebrate species:
 - The daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.0).
- (2) Chemical and physical analysis of an upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available, synthetic laboratory control water may be used.
- (3) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
- (4) Any and all chemical or physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% Effluent concentration in addition to analysis performed upon any other effluent concentration.
- (5) All chemical analyses shall be performed and results shall be recorded in the appropriate field of the report form. The parameters for chemical analysis include, but are not limited to Temperature (°C), pH (SU), Conductivity (µMohs), Dissolved Oxygen (mg/L), Total Residual Chlorine (mg/L), Un-ionized Ammonia (mg/L), Total Alkalinity (mg/L), and Total Hardness (mg/L).

(b) Reporting of Chronic Toxicity Monitoring Results

- (1) WET test results shall be submitted to the Southwest Regional Office, or by eDMR, with the permittee's Discharge Monitoring Reports by **January 28, 2019**. The submittal shall include:
 - i. A full laboratory report for all toxicity testing.
 - ii. Copies of chain-of-custody forms.
 - iii. The WET form provided by the Department upon permit issuance.
- (2) The report must include a quantification of chronic toxic units (TU_c = 100/IC₂₅) reported according to the *Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* chapter on report preparation and test review. The 25 percent Inhibition Effect Concentration (IC₂₅) is the toxic or effluent concentration that would cause 25 percent reduction in mean young per female or in growth for the test populations.

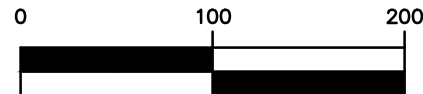
(c) Permit Reopener for Chronic Toxicity

In accordance with 40 CFR Parts 122 and 124, this permit may be modified to include effluent limitations or permit conditions to address chronic toxicity in the effluent or receiving waterbody, as a result of the discharge; or to implement new, revised, or newly interpreted water quality standards applicable to chronic toxicity.

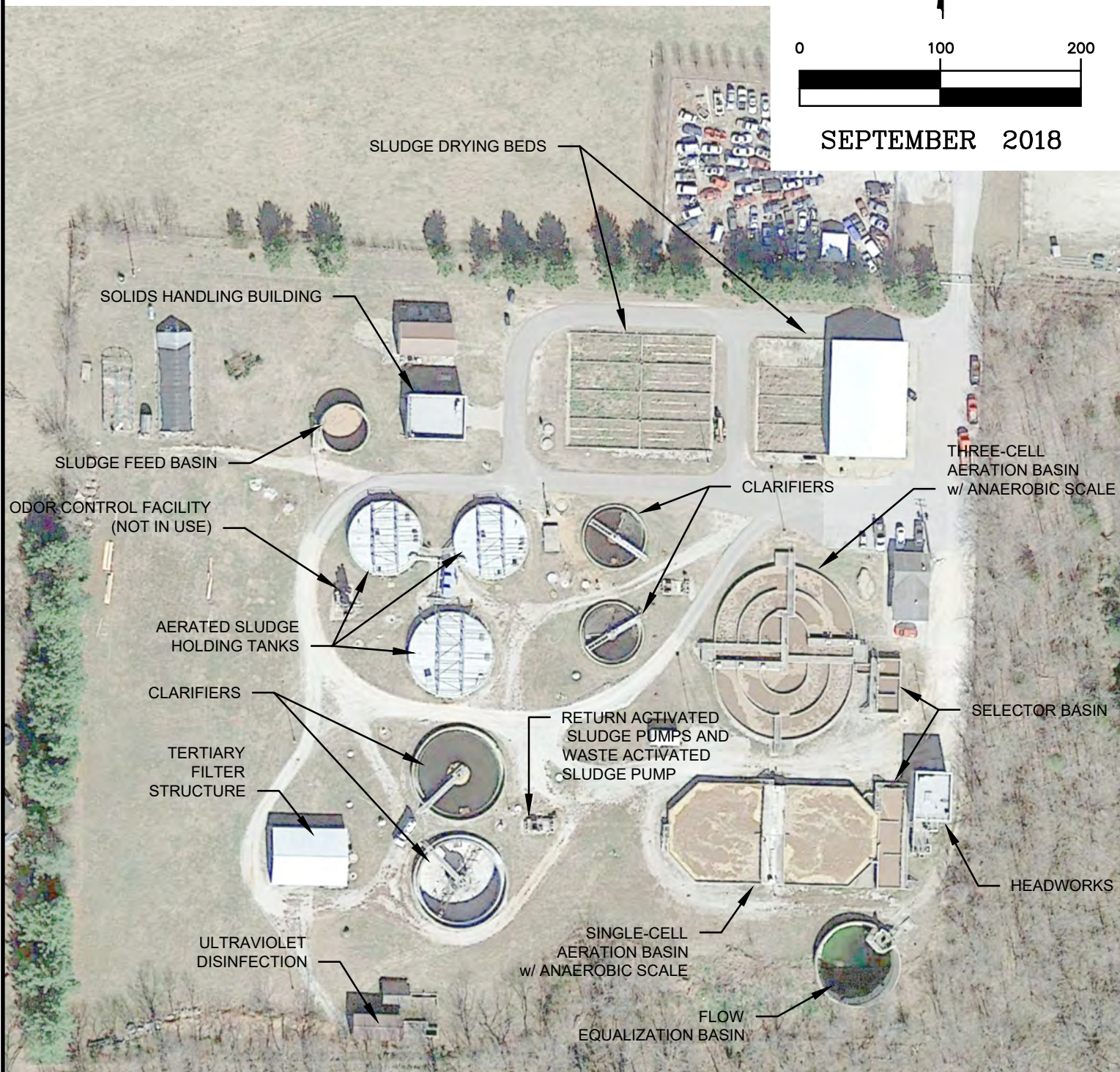
APPENDIX D
NORTH 22ND STREET WWTP FACILITY

DRAFT

S. 22ND STREET WASTE WATER TREATMENT FACILITY



SEPTEMBER 2018



DESIGN FLOW = 2.10 MILLION GALLONS PER DAY
ACTUAL FLOW = 1.27 MILLION GALLONS PER DAY



2804 N. Biagio Street.
Ozark, Missouri 65721

417-595-4108 (tel.)
417-595-4109 (fax)
mail@cochraneeng.com

- Civil Engineering
- Land Surveying
- Architecture
- Site Development
- General Consulting
- Master Planning

DWN. BY
KCB

DATE
9-10-2018

PROJ. NO.
SW18-130

APPENDIX E
ELK VALLEY WWTP OPERATING PERMIT

DRAFT

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0133671
Owner:	City of Ozark
Address:	205 N 1 st Street, Ozark, MO 65721
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	Elk Valley WWTF
Facility Address:	2979 Mc Lean Rd, Ozark, MO 65721
Legal Description:	NE ¼, NW ¼, Sec. 31, T27N, R21W, Christian County
UTM Coordinates:	X= 475308, Y= 4095497
Receiving Stream:	Finley Creek (P)
First Classified Stream and ID:	Finley Creek (P) (2352)
USGS Basin & Sub-watershed No.:	(11010002-0208)

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

Outfall #001 – POTW – SIC #4952

The use or operation of this facility shall be by or under the supervision of a Certified "B" Operator.

Bar screen/ Grit chamber/ oxidation ditch with anaerobic selector basin/ secondary clarifiers with flow splitter/ RAS/ WAS pump station/ tertiary filter/ effluent aeration structure and lift station/ UV disinfection Sludge: holding tank/ aerobic digester and storage tank/ sludge is land applied

Design population equivalent is 10,000.

Design flow is 1 million gallons per day.

Actual flow is 164,850 gallons per day.

Design sludge production is 266.5 dry tons/year.

This permit authorizes only wastewater and stormwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 621.250 RSMo, Section 640.013 RSMo and Section 644.051.6 of the Law.

October 1, 2015

Effective Date

Sara Parker Pauley, Director, Department of Natural Resources

September 30, 2020

Expiration Date

John Madros, Director, Water Protection Program

Permitted Feature #SM1 – Instream Monitoring
Instream monitoring location – Upstream – See Special Condition #21

Permitted Feature #SM2 – Instream Monitoring
Instream monitoring location – Downstream – See Special Condition #21

OUTFALL #001	TABLE A-1. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS					PERMIT NUMBER MO-0133671	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The interim effluent limitations shall become effective on October 1, 2015 , and remain in effect through September 30, 2017 . Such discharges shall be controlled, limited and monitored by the permittee as specified below:							
EFFLUENT PARAMETER(S)	UNITS	INTERIM EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS		
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE	
Flow	MGD	*		*	once/day	24 hr. estimate	
Biochemical Oxygen Demand ₅	mg/L		15	10	once/week	composite**	
Total Suspended Solids	mg/L		20	15	once/week	composite**	
<i>E. coli</i> (Note 1, Page 4)	#/100mL		630	126	once/week	grab	
Ammonia as N							
(March 1 – May 31)	mg/L	7.7		3.9	once/week	grab	
(June 1 – August 31)		3.7		1.9			
(September 1 – November 30)		7.7		3.9			
(December 1 – February 28)		8.7		4.3			
Total Phosphorus	mg/L	*		0.5	once/week	grab	
Total Nitrogen	mg/L	*		*	once/week	grab	
Aluminum, Total Recoverable (Note 2, Page 3)	µg/L	*		*	once/month	grab	
Iron, Total Recoverable (Note 2, Page 3)	µg/L	*		*	once/month	grab	
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>NOVEMBER 28, 2015</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.							
EFFLUENT PARAMETER(S)	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE	
Oil & Grease	mg/L	15		10	once/quarter	grab	
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2016</u> .							
EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE	
pH – Units ***	SU	6.0		9.0	once/week	grab	
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>NOVEMBER 28, 2015</u> .							

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

*** pH is measured in pH units and is not to be averaged.

OUTFALL #001	TABLE A-2. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS				PAGE NUMBER 3 of 11	
	PERMIT NUMBER MO-0133671					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on October 1, 2017 , and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/day	24 hr. estimate
Biochemical Oxygen Demand ₅	mg/L		15	10	once/week	composite**
Total Suspended Solids	mg/L		20	15	once/week	composite**
<i>E. coli</i> (Note 1, Page 4)	#/100mL		630	126	once/week	grab
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	4.1 9.4		1.6 3.3	once/week	grab
Total Phosphorus	mg/L	*		0.5	once/week	grab
Total Nitrogen	mg/L	*		*	once/week	grab
Aluminum, Total Recoverable (Note 2, Page 3)	µg/L	750		238.5	once/month	grab
Iron, Total Recoverable (Note 2, Page 3)	µg/L	*		*	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>NOVEMBER 28, 2017</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
EFFLUENT PARAMETER(S)	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Oil & Grease	mg/L	15		10	once/quarter	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2018</u> .						
EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units ***	SU	6.0		9.0	once/week	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>NOVEMBER 28, 2017</u> .						

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

*** pH is measured in pH units and is not to be averaged.

Note 1 - Effluent limitations and monitoring requirements for *E. coli* are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

Note 2 - If no Aluminum or Iron is used in a given sampling period, an actual analysis is not necessary. Simply report as "0 mg/L".

OUTFALL #001	TABLE A-3. WHOLE EFFLUENT TOXICITY FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS				PAGE NUMBER 4 of 11	
					PERMIT NUMBER MO-0133671	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on October 1, 2015 , and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Acute Whole Effluent Toxicity (Note 3)	TU _a	*			once/year	composite**
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>MAY 28, 2016</u> .						

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Note 3 – The Acute WET test shall be conducted annually during the permit cycle. See Special Condition #20 for additional requirements.

TABLE B. INFLUENT MONITORING REQUIREMENTS			PERMIT NUMBER MO-0133671
The facility is required to meet a removal efficiency of 85% or more as a monthly average. The monitoring requirements shall become effective on October 1, 2015 , and remain in effect until expiration of the permit. To determine removal efficiencies, the influent wastewater shall be monitored by the permittee as specified below:			
SAMPLING LOCATION AND PARAMETER(S)	UNITS	MONITORING REQUIREMENTS	
		MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand ₅	mg/L	once/quarter***	composite**
Total Suspended Solids	mg/L	once/quarter***	composite**
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2016</u> .			

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

*** See table below for quarterly sampling requirements.

Minimum Sampling Requirements			
Quarter	Months	Influent Parameters	Report is Due
First	January, February, March	Sample at least once during any month of the quarter	April 28 th
Second	April, May, June	Sample at least once during any month of the quarter	July 28 th
Third	July, August, September	Sample at least once during any month of the quarter	October 28 th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28 th

PERMITTED FEATURE #SM1	TABLE C-1. INSTREAM MONITORING REQUIREMENTS				PAGE NUMBER 5 of 11	
					PERMIT NUMBER MO-0133671	
The monitoring requirements shall become effective on October 1, 2015 , and remain in effect until expiration of the permit.						
PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Total Phosphorus	mg/L	*		*	once/quarter****	grab
Total Nitrogen	mg/L	*		*	once/quarter****	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2016</u> .						

* Monitoring requirement only.

**** See table below for quarterly sampling

Minimum Sampling Requirements			
Quarter	Months	Total Nitrogen & Total Phosphorus	Report is Due
First	January, February, March	Sample at least once during any month of the quarter	April 28 th
Second	April, May, June	Sample at least once during any month of the quarter	July 28th
Third	July, August, September	Sample at least once during any month of the quarter	October 28th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28th

PERMITTED FEATURE #SM2	TABLE C-2. INSTREAM MONITORING REQUIREMENTS					
The monitoring requirements shall become effective on October 1, 2015 , and remain in effect until expiration of the permit.						
PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Hardness, Total	mg/L	*		*	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2016</u> .						

* Monitoring requirement only.

D. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Parts I, II, & III standard conditions dated August 1, 2014, May 1, 2013, and March 1, 2015, and hereby incorporated as though fully set forth herein.

E. SPECIAL CONDITIONS

1. This permit establishes final ammonia limitations based on Missouri's current Water Quality Standard. On August 22, 2013, the U.S. Environmental Protection Agency (EPA) published a notice in the Federal Register announcing of the final national recommended ambient water quality criteria for protection of aquatic life from the effects of ammonia in freshwater. The EPA's guidance, Final Aquatic Life Ambient Water Quality Criteria for Ammonia – Fresh Water 2013, is not a rule, nor automatically part of a state's water quality standards. States must adopt new ammonia criteria consistent with EPA's published ammonia criteria into their water quality standards that protect the designated uses of the water bodies. The Department of Natural Resources has initiated stakeholder discussions on how to best incorporate these new criteria into the State's rules. A date for when this rule change will occur has not been determined. Also, refer to Section VI of this permit's factsheet for further information including estimated future effluent limits for this facility. It is recommended the permittee view the Department's 2013 EPA criteria Factsheet located at <http://dnr.mo.gov/pubs/pub2481.htm>.
2. This permit may be reopened and modified, or alternatively revoked and reissued, to:
 - (a) Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
 - (1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
 - (2) controls any pollutant not limited in the permit.
 - (b) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
 - (c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.
 - (d) Incorporate the requirement to develop a pretreatment program pursuant to 40 CFR 403.8(a) when the Director of the Water Protection Program determines that a pretreatment program is necessary due to any new introduction of pollutants into the Publicly Owned Treatment Works or any substantial change in the volume or character of pollutants being introduced.The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.
3. All outfalls must be clearly marked in the field. This does not include instream monitoring locations.
4. Permittee will cease discharge by connection to a facility with an area-wide management plan per 10 CSR 20-6.010(3)(B) within 90 days of notice of its availability.
5. Report as no-discharge when a discharge does not occur during the report period.
6. Water Quality Standards
 - (a) To the extent required by law, discharges to waters of the state shall not cause a violation of water quality standards rule under 10 CSR 20-7.031, including both specific and general criteria.
 - (b) General Criteria. The following general water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
 - (1) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
 - (2) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
 - (3) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
 - (4) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
 - (5) There shall be no significant human health hazard from incidental contact with the water;
 - (6) There shall be no acute toxicity to livestock or wildlife watering;
 - (7) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;

E. SPECIAL CONDITIONS (continued)

- (8) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.

7. Changes in existing pollutants or the addition of new pollutants to the treatment facility

The permittee must provide adequate notice to the Director of the following:

- (a) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; and
- (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
- (c) For purposes of this paragraph, adequate notice shall include information on:
 - (1) the quality and quantity of effluent introduced into the POTW, and
 - (2) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

8. Reporting of Non-Detects:

- (a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
- (b) The permittee shall not report a sample result as "Non-Detect" without also reporting the detection limit of the test. Reporting as "Non Detect" without also including the detection limit will be considered failure to report, which is a violation of this permit.
- (c) The permittee shall provide the "Non-Detect" sample result using the less than sign and the minimum detection limit (e.g. <10).
- (d) The permittee shall use one-half of the detection limit for the non-detect result when calculating monthly averages.
- (e) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.

9. It is a violation of the Missouri Clean Water Law to fail to pay fees associated with this permit (6-44.055 RSMo).

10. The permittee shall comply with any applicable requirements listed in 10 CSR 20-9, unless the facility has received written notification that the Department has approved a modification to the requirements. The monitoring frequencies contained in this permit shall not be construed by the permittee as a modification of the monitoring frequencies listed in 10 CSR 20-9. If a modification of the monitoring frequencies listed in 10 CSR 20-9 is needed, the permittee shall submit a written request to the Department for review and, if deemed necessary, approval.
11. The permittee shall develop and implement a program for maintenance and repair of the collection system. The recommended guidance is the US EPA's Guide For Evaluating Capacity, Management, Operation, And Maintenance (CMOM) Programs At Sanitary Sewer Collection Systems (Document number EPA 305-B-05-002). The permittee shall report all bypasses and Sanitary Sewer Overflows (SSO) using the Sanitary Sewer Overflow/Facility Bypass Application, located at <http://dnr.mo.gov/modnrcag/>.

The permittee shall also submit a report to the Southwest Regional Office annually, by January 28th, for the previous calendar year. The report shall contain the following information:

- (a) A summary of the efforts to locate and eliminate sources of excessive infiltration and inflow into the collection system serving the facility for the previous year.
 - (b) A summary of the general maintenance and repairs to the collection system serving the facility for the previous year.
 - (c) A summary of any planned maintenance and repairs to the collection system serving the facility for the upcoming calendar year. This list shall include locations (GPS, 911 address, manhole number, etc.) and actions to be taken.
12. Bypasses are not authorized at this facility unless they meet the criteria in 40 CFR 122.41(m). If a bypass occurs, the permittee shall report in accordance to 40 CFR 122.41(m)(3)(i), and with Standard Condition Part I, Section B, subsection 2.b. Bypasses are to be reported to the Southwest Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. Blending, which is the practice of combining a partially-treated wastewater process stream with a fully-treated wastewater process stream prior to discharge, is not considered a form of bypass. If the permittee wishes to utilize blending, the permittee shall file an application to modify this permit to facilitate the inclusion of appropriate monitoring conditions.

E. SPECIAL CONDITIONS (continued)

13. The facility must be sufficiently secured to restrict entry by children, livestock and unauthorized persons as well as to protect the facility from vandalism.
14. At least one gate must be provided to access the wastewater treatment facility and provide for maintenance and mowing. The gate shall remain closed except when temporarily opened by; the permittee to access the facility, perform operational monitoring, sampling, maintenance, mowing, or for inspections by the Department. The gate shall be closed and locked when the facility is not staffed.
15. At least one (1) warning sign shall be placed on each side of the facility enclosure in such positions as to be clearly visible from all directions of approach. There shall also be one (1) sign placed for every five hundred feet (500') (150 m) of the perimeter fence. A sign shall also be placed on each gate. Minimum wording shall be SEWAGE TREATMENT FACILITY—KEEP OUT. Signs shall be made of durable materials with characters at least two inches (2") high and shall be securely fastened to the fence, equipment or other suitable locations.
16. An Operation and Maintenance (O & M) manual shall be maintained by the permittee and made available to the operator. The O & M manual shall include key operating procedures and a brief summary of the operation of the facility.
17. An all-weather access road shall be provided to the treatment facility.
18. The discharge from the wastewater treatment facility shall be conveyed to the receiving stream via a closed pipe or a paved or rip-rapped open channel. Sheet or meandering drainage is not acceptable. The outfall sewer shall be protected against the effects of floodwater, ice or other hazards as to reasonably insure its structural stability and freedom from stoppage. The outfall shall be maintained so that a sample of the effluent can be obtained at a point after the final treatment process and before the discharge mixes with the receiving waters.
19. Land application of biosolids shall be conducted in accordance with Standard Conditions III and a Department approved biosolids management plan. Land application of biosolids during frozen, snow covered, or saturated soil conditions in accordance with the additional requirements specified in WQ426 shall occur only with prior approval from the Department.

E. SPECIAL CONDITIONS (continued)

20. Acute Whole Effluent Toxicity (WET) tests shall be conducted as follows:

SUMMARY OF ACUTE WET TESTING FOR THIS PERMIT					
OUTFALL	AEC	Acute Toxic Unit (TU _a)	FREQUENCY	SAMPLE TYPE	MONTH
001	100%	*	once/year	24 hr. composite	Any

* Monitoring requirement only.

DILUTION SERIES						
100%	50%	25%	12.5%	6.25%	(Control) 100% upstream, if available	(Control) 100% Lab Water, also called synthetic water

(a) Freshwater Species and Test Methods

- (1) Species and short-term test methods for estimating the acute toxicity of NPDES effluents are found in the most recent edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 48-hour static non-renewal toxicity tests with the following vertebrate species:
 - The fathead minnow, *Pimephales promelas* (Acute Toxicity Test Method 2000.0).
 And the following invertebrate species:
 - The daphnid, *Ceriodaphnia dubia* (Acute Toxicity Test Method 2002.0).
- (2) Chemical and physical analysis of an upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available, synthetic laboratory control water may be used.
- (3) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
- (4) Any and all chemical or physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% Effluent concentration in addition to analysis performed upon any other effluent concentration.
- (5) All chemical analyses shall be performed and results shall be recorded in the appropriate field of the report form. The parameters for chemical analysis include Temperature (°C), pH (SU), Conductivity (µmohs/cm), Un-ionized Ammonia (mg/L), Total Alkalinity (mg/L), and Total Hardness (mg/L), Total Residual Aluminum (µg/L), Total Residual Iron (µg/L).

(b) Reporting of Acute Toxicity Monitoring Results

- (1) WET test results shall be submitted to the Southwest Regional Office, or by eDMR, with the permittee's Discharge Monitoring Reports annually by Month, 28, 20XX. The submittal shall include:
 - i. A full laboratory report for all toxicity testing.
 - ii. Copies of chain-of-custody forms.
 - iii. The WET form provided by the Department upon permit issuance.
- (2) The report must include a quantification of acute toxic units (TU_a = 100/LC₅₀) reported according to the test methods manual chapter on report preparation and test review. The Lethal Concentration, 50 Percent (LC₅₀) is the toxic or effluent concentration that would cause death in 50 percent of the test organisms over a specified period of time.

(c) Permit Reopener for Acute Toxicity

In accordance with 40 CFR Parts 122 and 124, this permit may be modified to include effluent limitations or permit conditions to address acute toxicity in the effluent or receiving waterbody, as a result of the discharge; or to implement new, revised, or newly interpreted water quality standards applicable to acute toxicity.

21. Receiving Water Monitoring Conditions

- (a) Downstream receiving water samples should be taken at the location(s) specified on Page 2 of this permit. In the event that a safe, accessible location is not present at the location(s) listed, a suitable location can be negotiated with the Department. Samples should be taken at least four feet from the bank or from the middle of the stream (whichever is less) and 6-inches below the surface. The upstream receiving water sample should be collected at a point upstream from any influence of the effluent, where the water is visibly flowing down stream.
- (b) When conducting in-stream monitoring, the permittee shall record observations that include: the time of day, weather conditions, unusual stream characteristics (e.g., septic conditions, algae growth, etc.), the stream segment (e.g., riffle, pool or run) from where the sample was collected. These observations shall be submitted with the sample results.

E. SPECIAL CONDITIONS (continued)

- (c) Samples shall not be collected from areas with especially turbulent flow, still water or from the stream bank, unless these conditions are representative of the stream reach or no other areas are available for sample collection. Sampling should not be made when significant precipitation has occurred recently. The sampling event should be terminated and rescheduled if any of the following conditions occur:
 - If turbidity in the stream increases notably; or
 - If rainfall over the past two weeks exceeds 2.5 inches or exceeds 1 inch in the last 24 hours
 - (d) Always use the correct sampling technique and handling procedure specified for the parameter of interest. Please refer to the latest edition of Standard Methods for the Examination of Water and Wastewater for further discussion of proper sampling techniques. All analyses must be conducted in accordance with an approved EPA method. Meters shall be calibrated immediately (within 1 hour) prior to the sampling event.
 - (e) To obtain accurate measurements, pH analyses should be performed on-site in the receiving stream where possible. However, due to high flow conditions, access, etc., it may be necessary to collect a sample in a bucket or other container. When this is necessary, care must be taken not to aerate the sample upon collection. If for any reason samples must be collected from an alternate site from the one listed in the permit, the permittee shall report the location with the sample results.
 - (f) Please contact the Department if you need additional instructions or assistance.
23. Stormwater Pollution Prevention Plan (SWPPP): A SWPPP must be developed and implemented within 180 days of the effective date of the permit. Through implementation of the SWPPP, the permittee shall minimize the release of pollutants in stormwater from the facility to the waters of the state. The SWPPP shall be developed in consultation with the concepts and methods described in the following document: Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators, (Document number EPA 833-B-09-002) published by the United States Environmental Protection Agency (USEPA) in February 2009.
- (a) The SWPPP must identify any stormwater outfall from the facility and Best Management Practices (BMPs) used to prevent or reduce the discharge of contaminants in stormwater. The stormwater outfalls shall either be marked in the field or clearly marked on a map and maintained with the SWPPP.
 - (b) The SWPPP must include a schedule and procedures for a once per month routine site inspection.
 - i. The monthly routine inspection shall be documented in a brief written report, which shall include:
 - i. The person(s) conducting the inspection.
 - ii. The inspection date and time.
 - iii. Weather information for the day of the inspection.
 - iv. Precipitation information for the entire period since the last inspection.
 - v. Description of the discharges observed, including visual quality of the discharges (sheen, turbid, etc.).
 - vi. Condition of BMPs
 - vii. If BMPs were replaced or repaired.
 - viii. Observations and evaluations of BMP effectiveness.
 - ii. Any deficiency observed during the routine inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
 - iii. The routine inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
 - iv. The routine inspection reports shall be made available to Department personnel upon request.
 - (c) The SWPPP must include a schedule and procedures for a once per year comprehensive site inspection.
 - (1) The annual comprehensive inspection shall be documented in a written report, which shall include:
 - i. The person(s) conducting the inspection.
 - ii. The inspection date and time.
 - iii. Findings from the areas of your facility that were examined;
 - iv. All observations relating to the implementation of your control measures including:
 - 1. Previously unidentified discharges from the site,
 - 2. Previously unidentified pollutants in existing discharges,
 - 3. Evidence of, or the potential for, pollutants entering the drainage system;
 - 4. Evidence of pollutants discharging to receiving waters at all facility outfall(s), and the condition of and around the outfall, and
 - 5. Additional control measures needed to address any conditions requiring corrective action identified during the inspection.
 - v. Any required revisions to the SWPPP resulting from the inspection;
 - vi. Any incidence of noncompliance observed or a certification stating that the facility is in compliance with Special Condition 23.
 - (2) Any deficiency observed during the comprehensive inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
 - (3) The comprehensive inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
 - (4) The comprehensive inspection reports shall be made available to Department personnel upon request.

E. SPECIAL CONDITIONS (continued)

- (d) The SWPPP must be kept on-site and should not be sent to the Department unless specifically requested.
- (e) The SWPPP must be reviewed and updated at a minimum once per permit cycle, as site conditions or control measures change.

24. The permittee shall select, install, use, operate, and maintain the Best Management Practices prescribed in the SWPPP.

- (a) Permittee shall adhere to the following minimum Best Management Practices (BMPs):
 - i. Minimize the exposure of industrial material storage areas, loading and unloading areas, dumpsters and other disposal areas, maintenance activities, and fueling operations to rain, snow, snowmelt, and runoff, by locating industrial materials and activities inside or protecting them with storm resistant coverings, if warranted and practicable.
 - ii. Provide good housekeeping practices on the site to prevent potential pollution sources from coming into contact with stormwater and provide collection facilities and arrange for proper disposal of waste products, including sludge.
 - iii. Implement a maintenance program to ensure that the structural control measures and industrial equipment is kept in good operating condition and to prevent or minimize leaks and other releases of pollutants.
 - iv. Prevent or minimize the spillage or leaks of fluids, oil, grease, fuel, etc. from equipment and vehicle maintenance, equipment and vehicle cleaning, or activities.
 - v. Provide sediment and erosion control sufficient to prevent or control sediment loss off of the property. This could include the use of straw bales, silt fences, or sediment basins, if needed.
 - vi. Provide stormwater runoff controls to divert, infiltrate, reuse, contain, or otherwise minimize pollutants in the stormwater discharge.
 - vii. Enclose or cover storage piles of salt or piles containing salt, used for deicing or other commercial or industrial purposes.
 - viii. Provide training to all employees who; work in areas where industrial materials or activities are exposed to stormwater, are responsible for stormwater inspections, are members of the Pollution Prevention Team. Training must cover the specific control measures and monitoring, inspection, planning, reporting and documentation requirements of this permit. Training is recommended annually for any applicable staff and whenever a new employee is hired who meets the description above.
 - ix. Eliminate and prevent unauthorized non-stormwater discharges at the facility.
 - x. Minimize generation of dust and off-site tracking of raw, final, or waste materials by implementing appropriate control measures.

25. Discharge Monitoring Reports

- (a) All reports and results required to be submitted by the permit, excluding 24-hr. bypass reporting, must be submitted to the Department via the electronic Discharge Monitoring Report Submission System (eDMR). In regards to Standard Conditions Part I, Section B, #7, the eDMR data reporting system is the only Department approved reporting method for this permit.
- (b) To access the eDMR data reporting system, use the following link in your web browser: <https://edmr.dnr.mo.gov/edmr/E2/Shared/Pages/Main/Login.aspx>.

F. SCHEDULE OF COMPLIANCE

The facility shall attain compliance with final effluent limitations as soon as reasonably achievable or no later than **2 years** of the effective date of this permit.

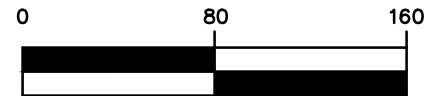
- 1. Within six months of the effective date of this permit, the permittee shall report progress made in attaining compliance with the final effluent limits.
- 2. The permittee shall submit interim progress reports detailing progress made in attaining compliance with the final effluent limits every 12 months from effective date.
- 3. Within **2 years** of the effective date of this permit, the permittee shall attain compliance with the final effluent limits.

Please submit progress reports to the Missouri Department of Natural Resources, Southwest Regional Office, 2040 W. Woodland, Springfield, MO 65807.

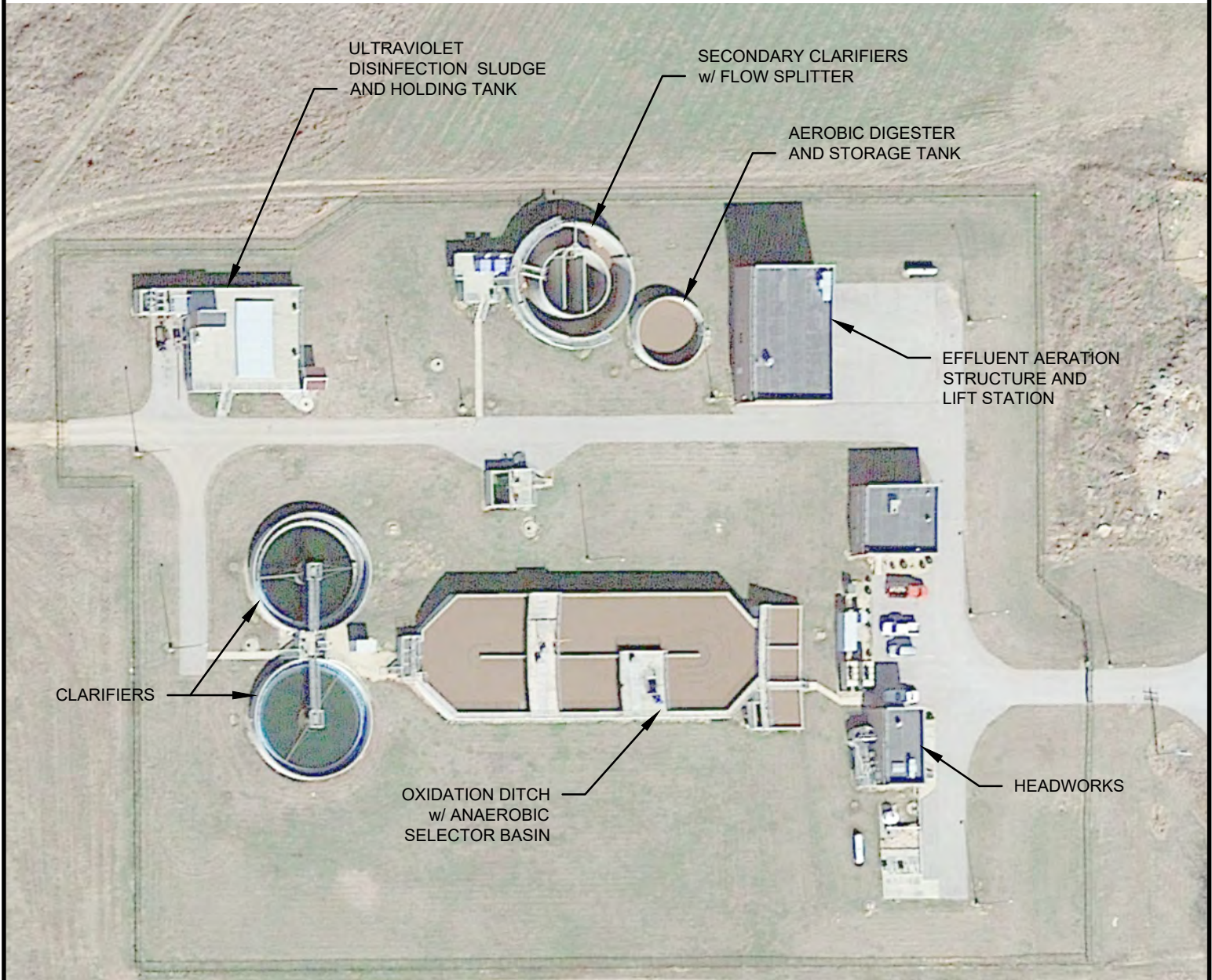
APPENDIX F
ELK VALLEY WWTP FACILITY

DRAFT

ELK VALLEY WASTE WATER TREATMENT FACILITY



MAY 2018



2804 N. Biagio Street.
Ozark, Missouri 65721

417-595-4108 (tel.)
417-595-4108 (fax)
mail@cochraneng.com

- Civil Engineering
- Land Surveying
- Architecture
- Site Development
- General Consulting
- Master Planning

DWN. BY
CLD

DATE
5-2-18

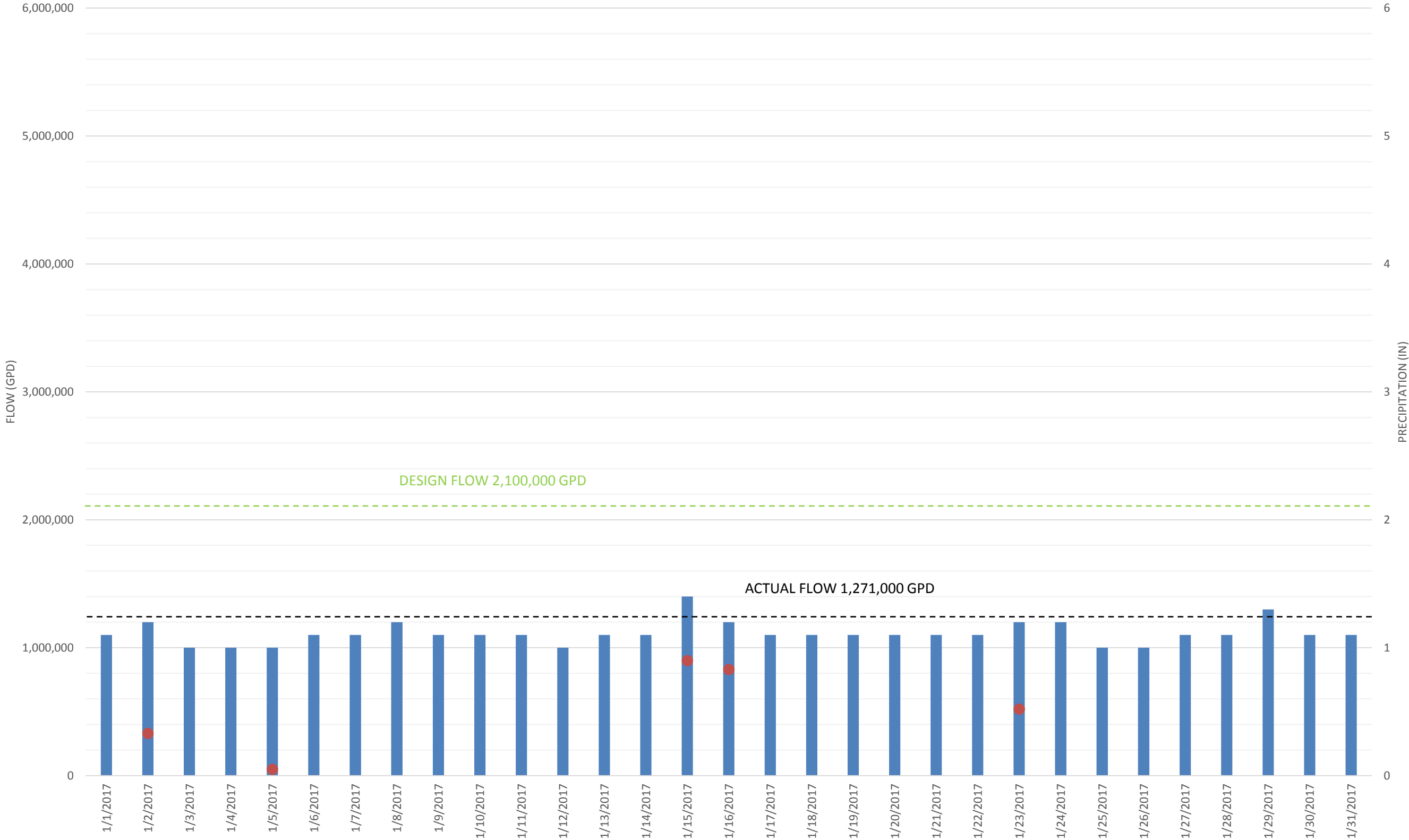
PROJ. NO.
SW18-130

APPENDIX G
NORTH 22ND STREET WWTP FLOW DATA

DRAFT

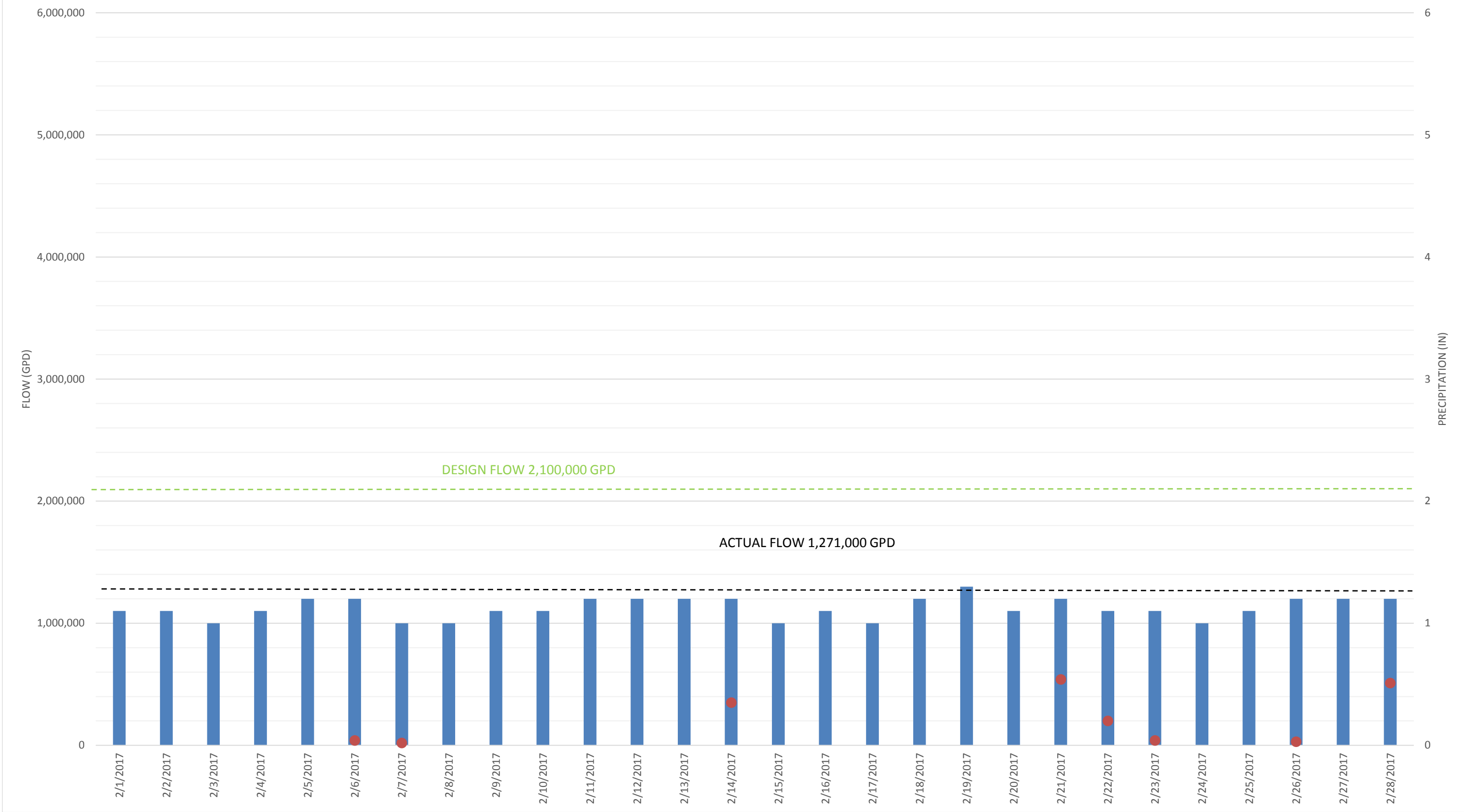
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

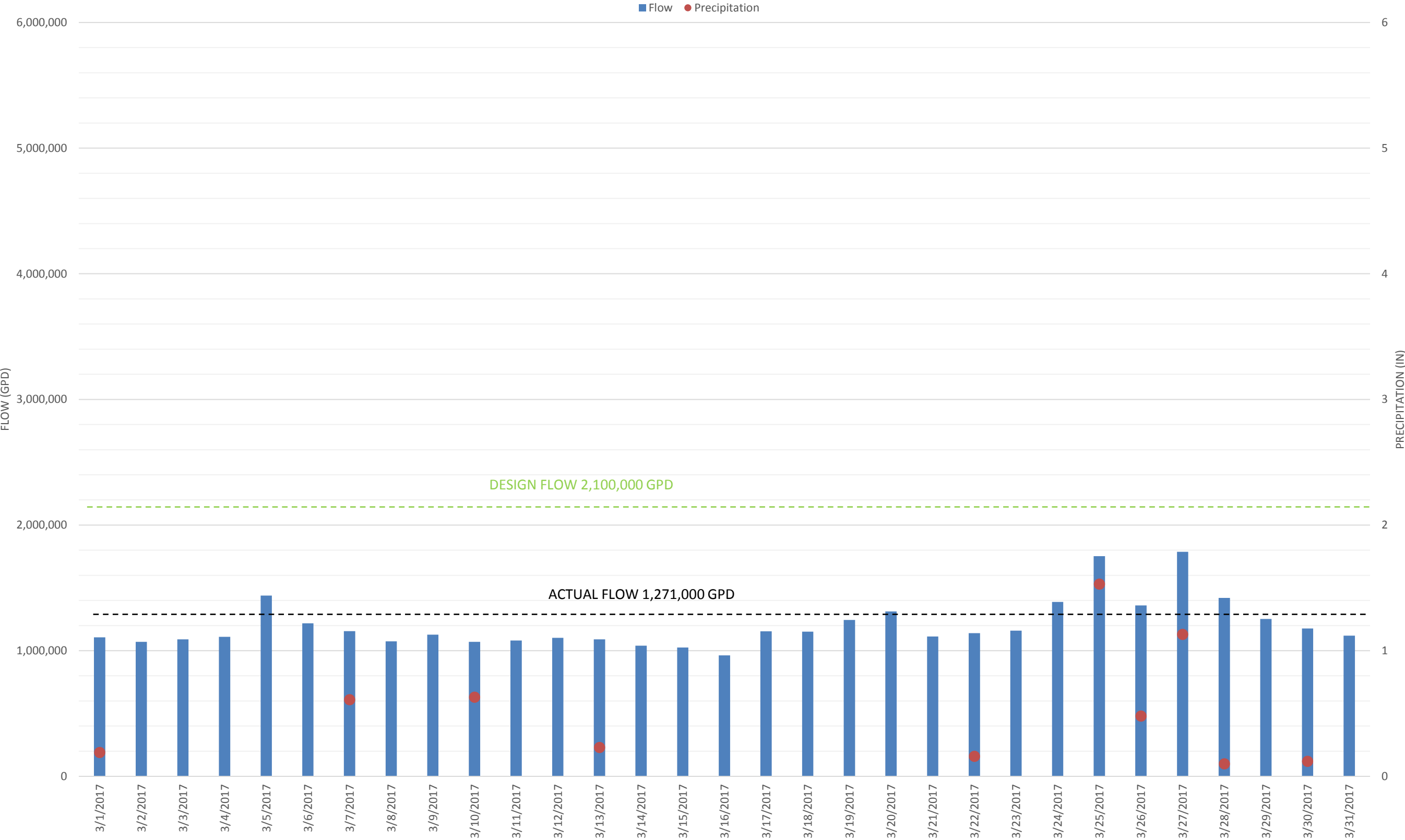


NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

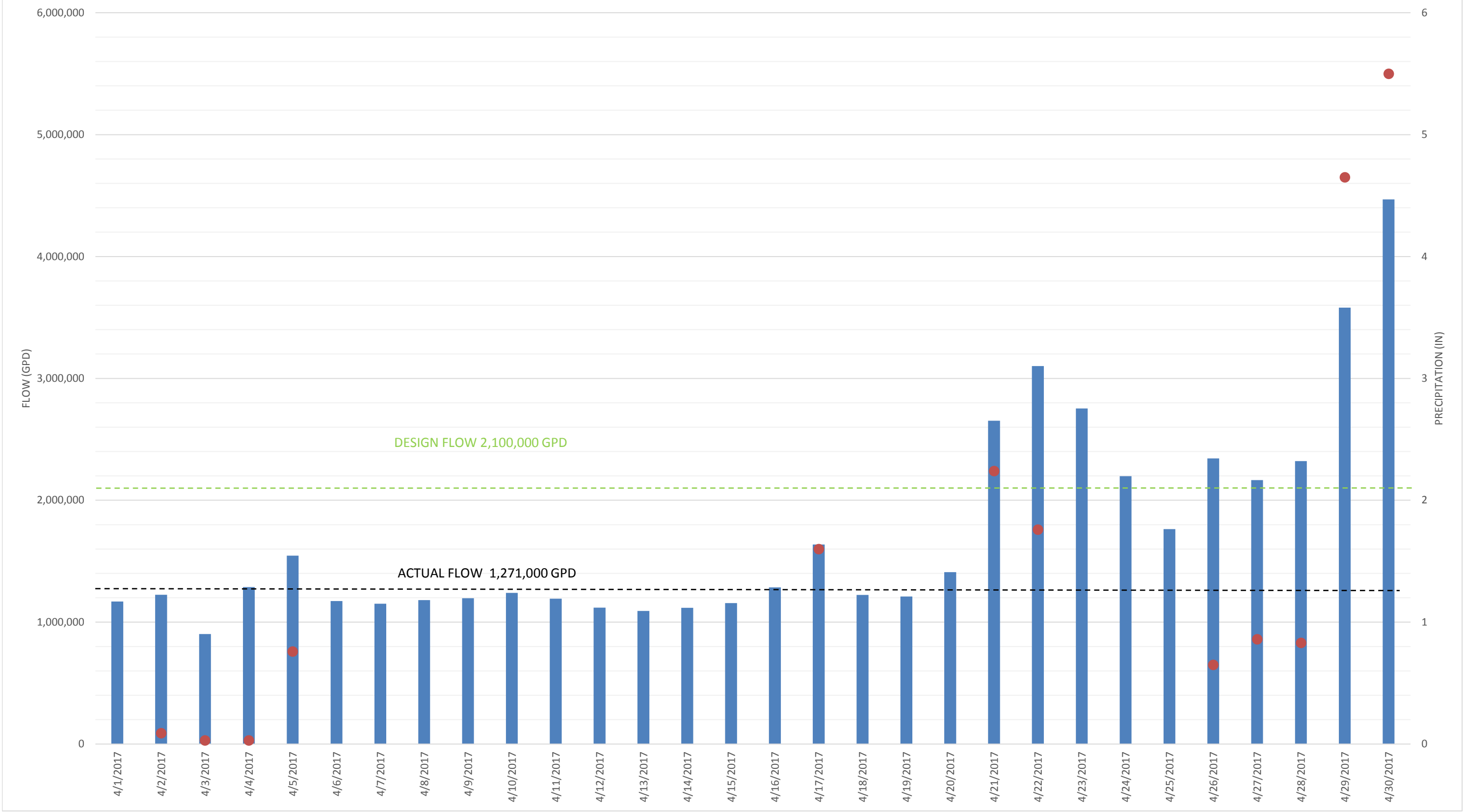


NORTH WASTEWATER TREATMENT PLANT DAILY FLOW



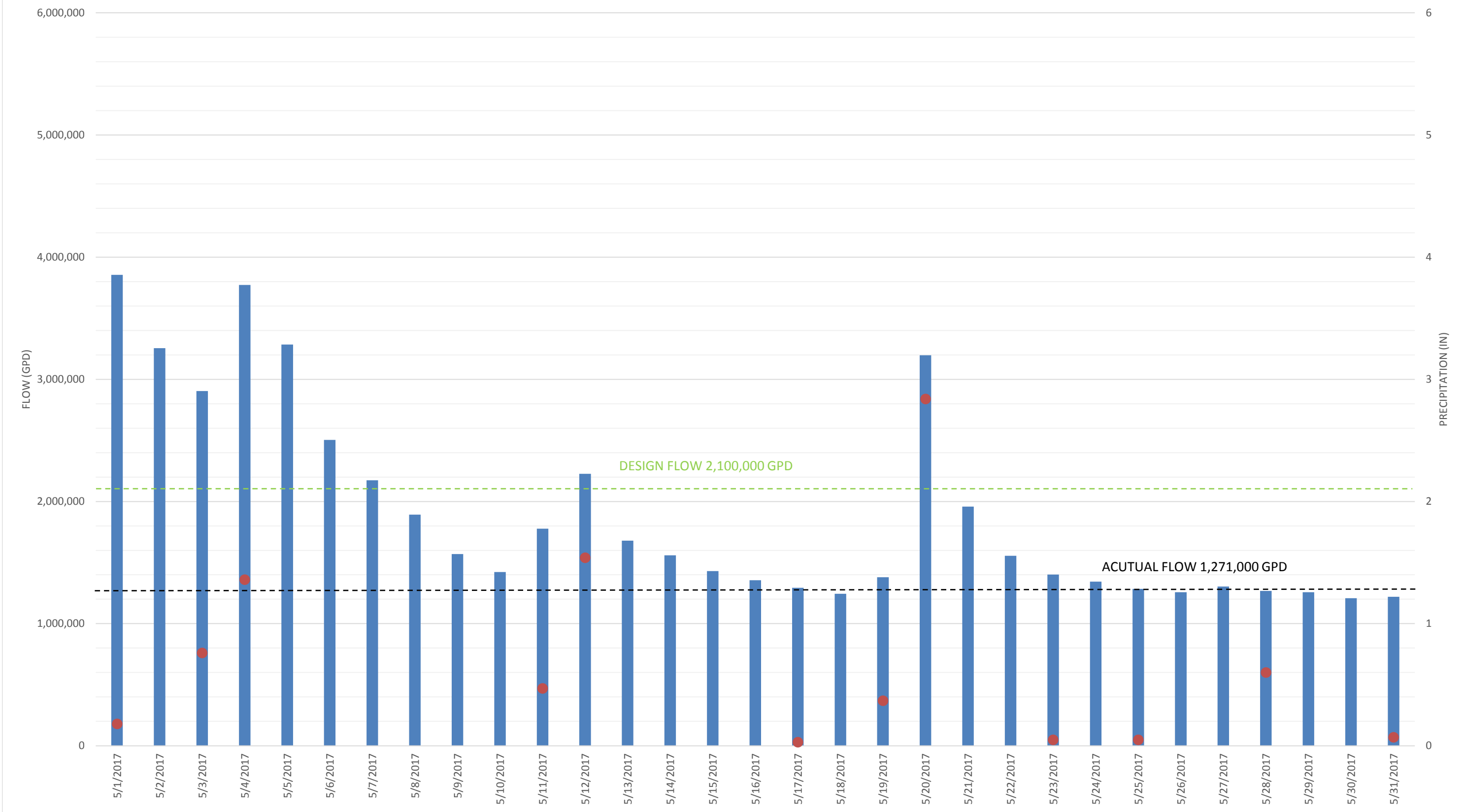
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Flow Precipitation



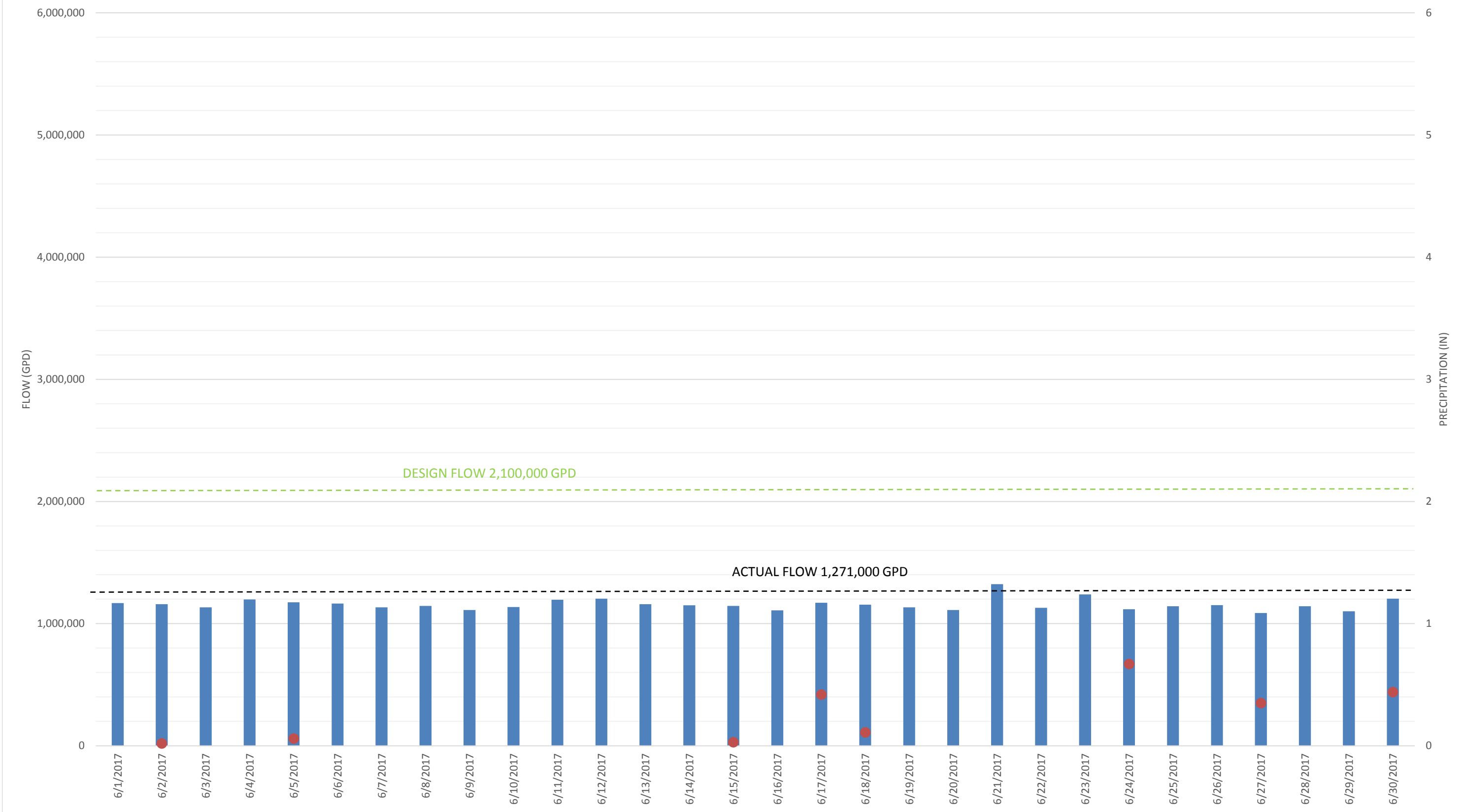
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



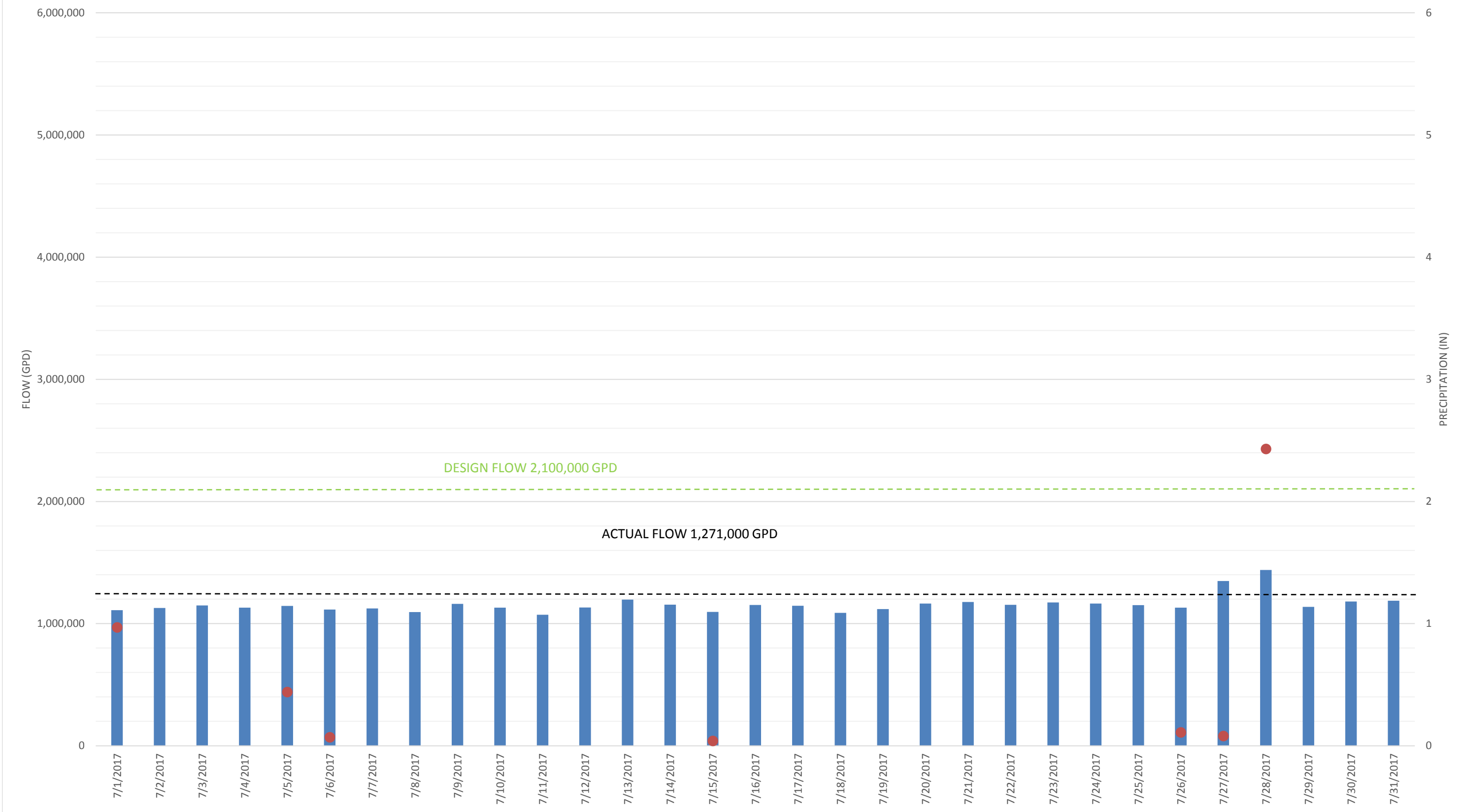
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



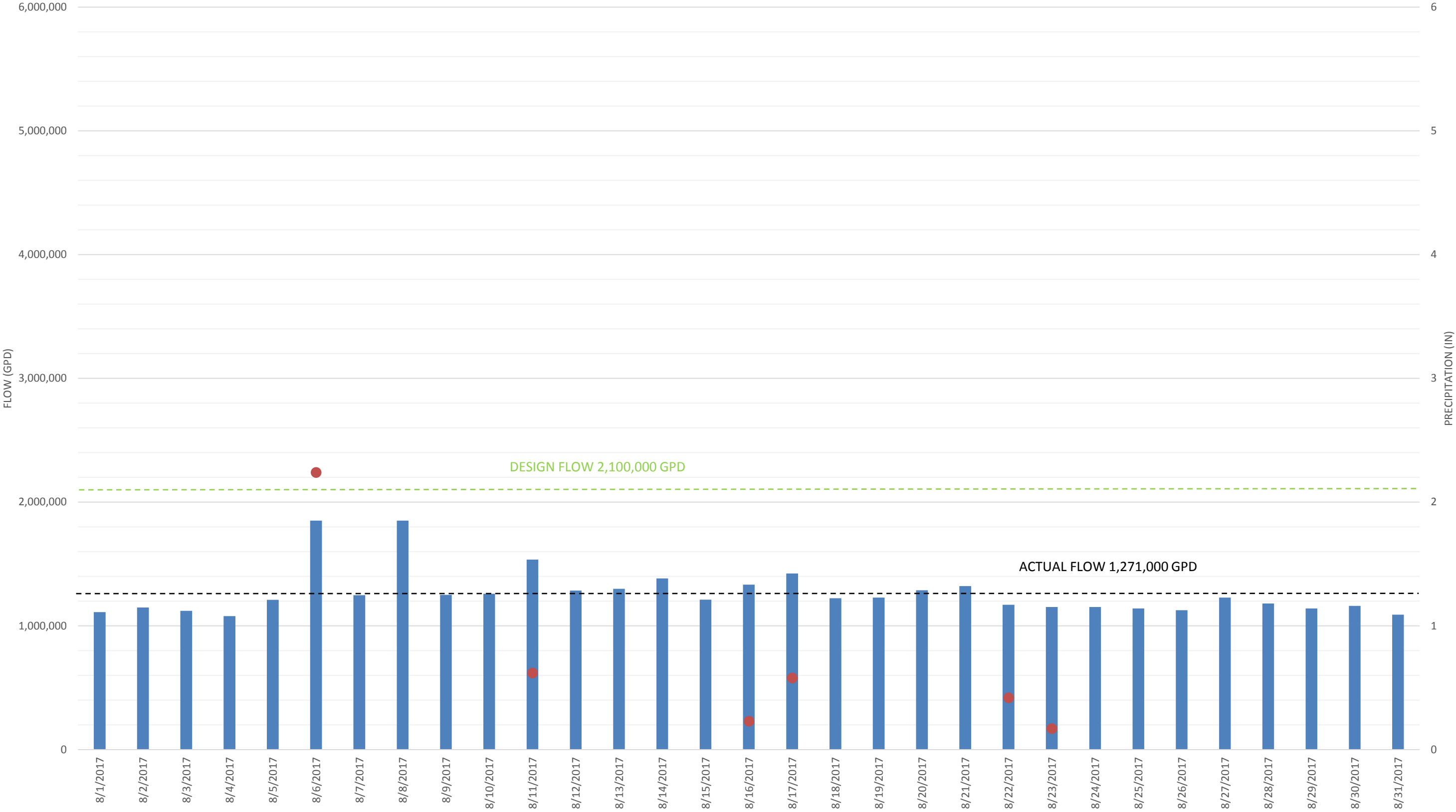
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation



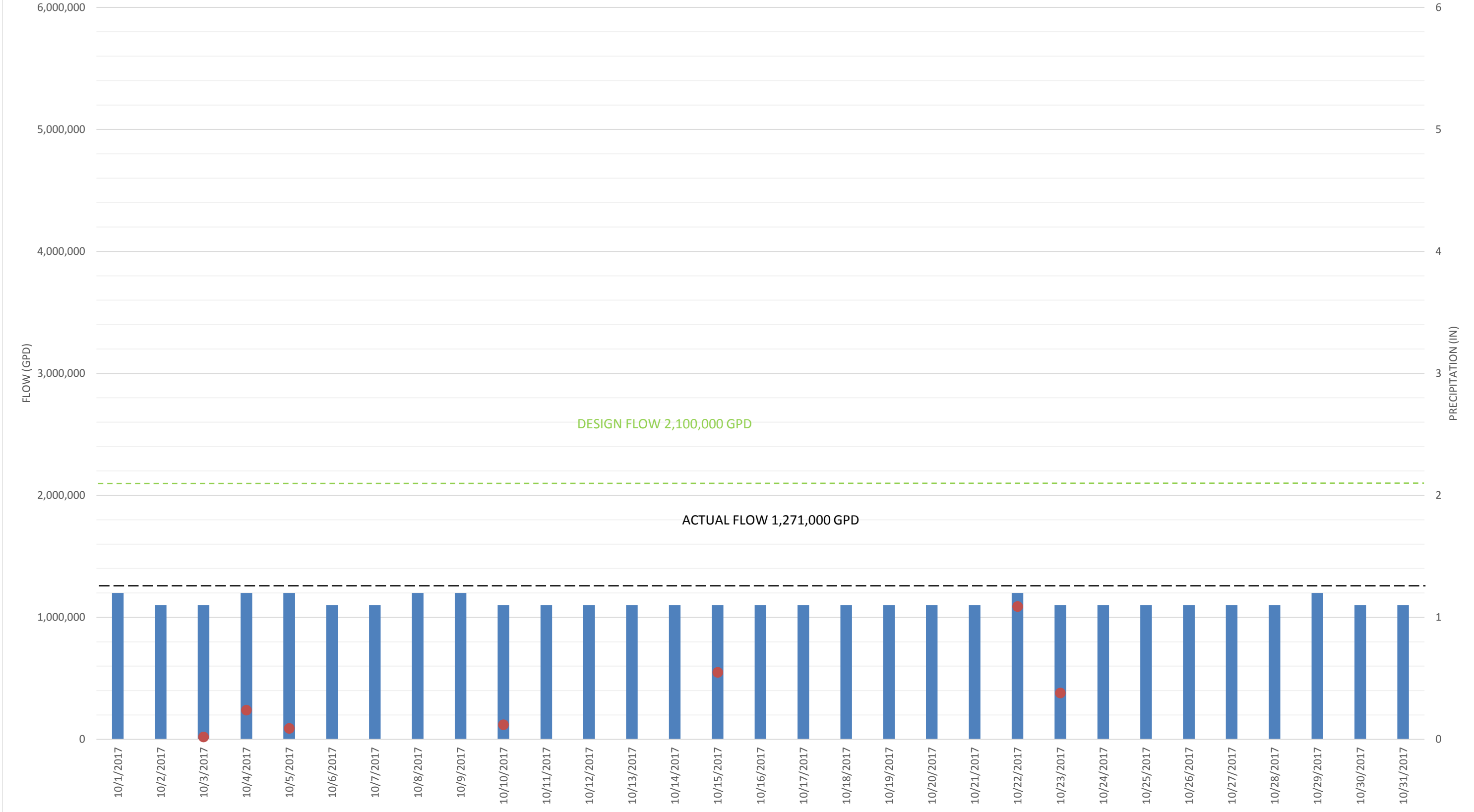
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



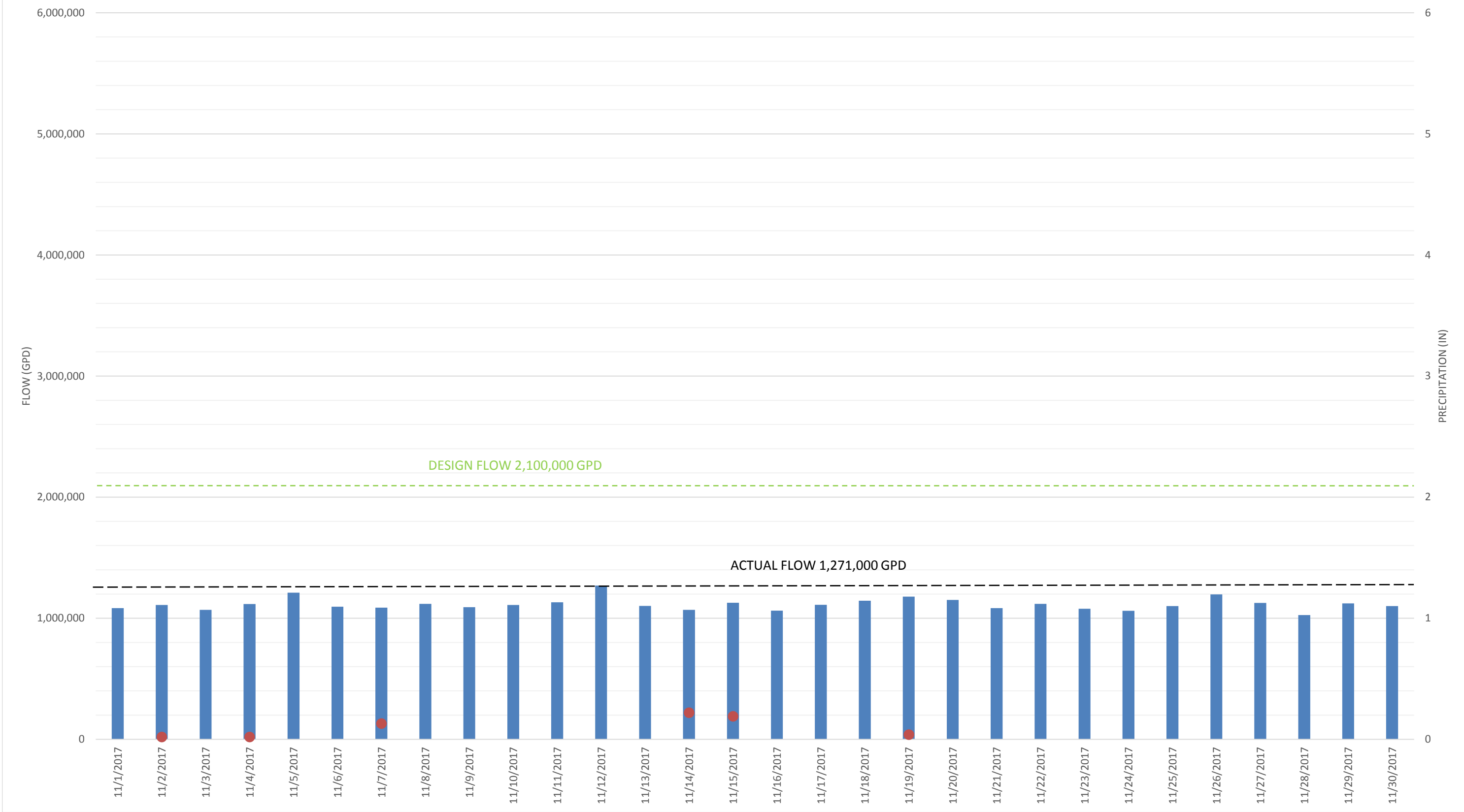
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



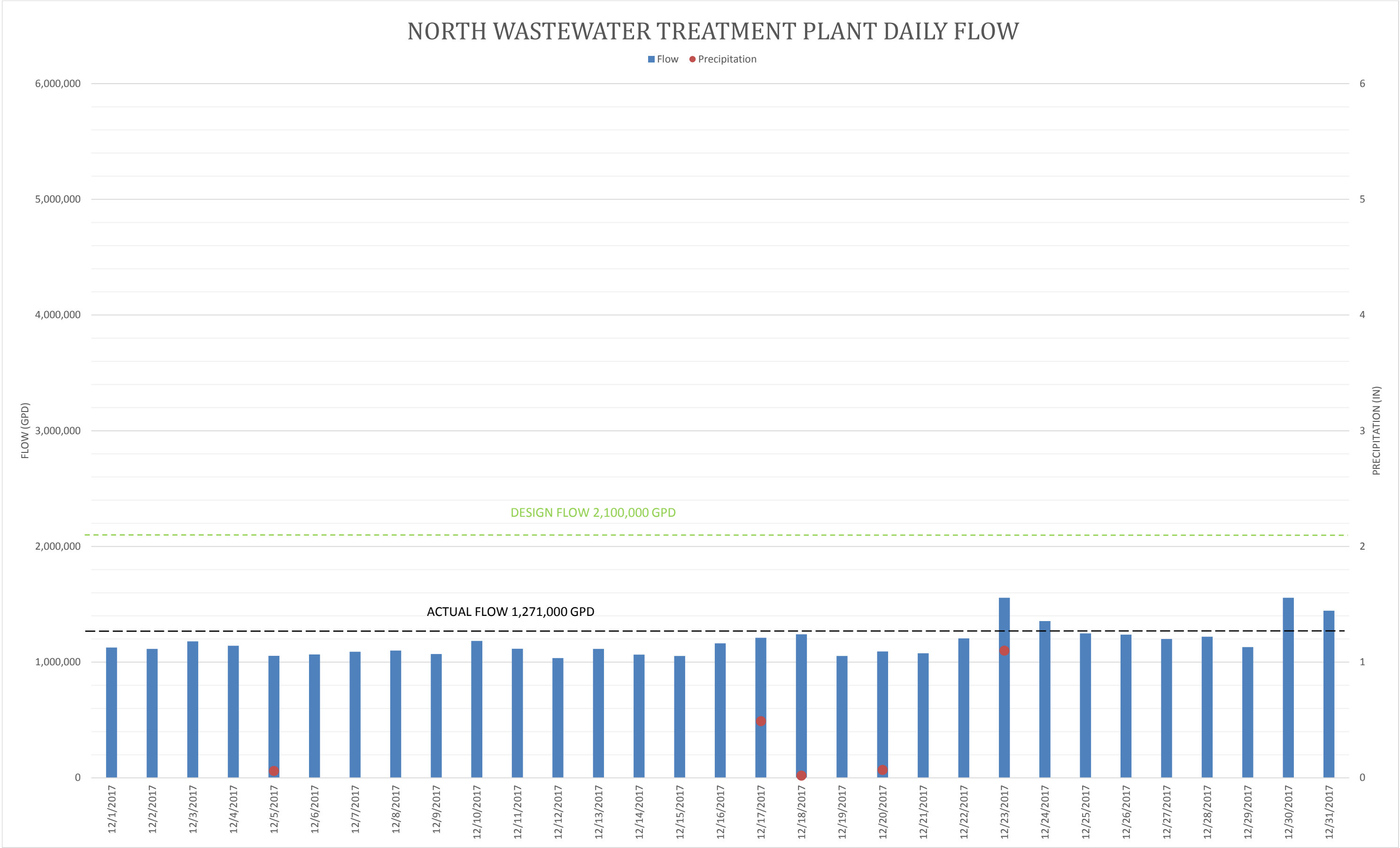
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation

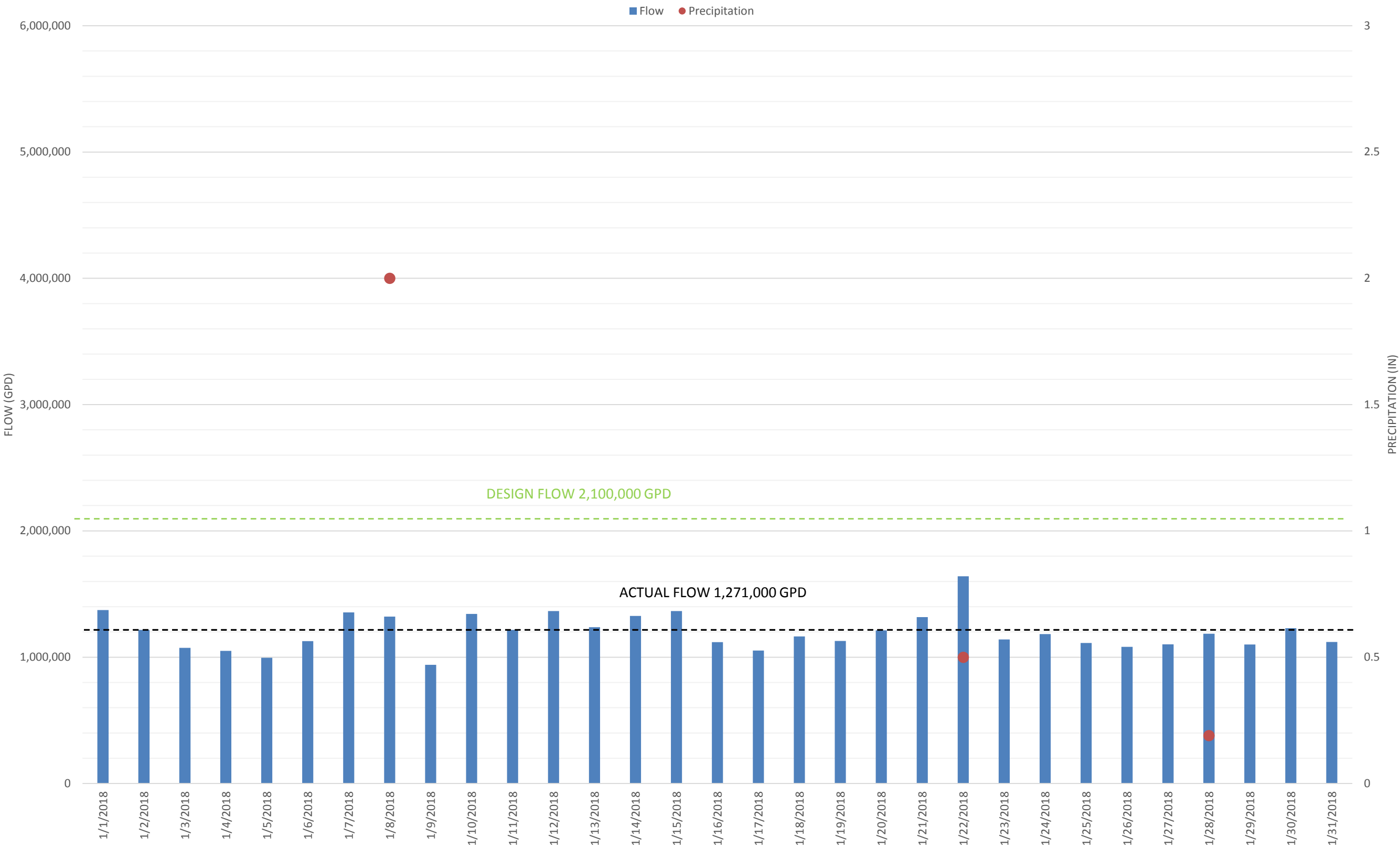


NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

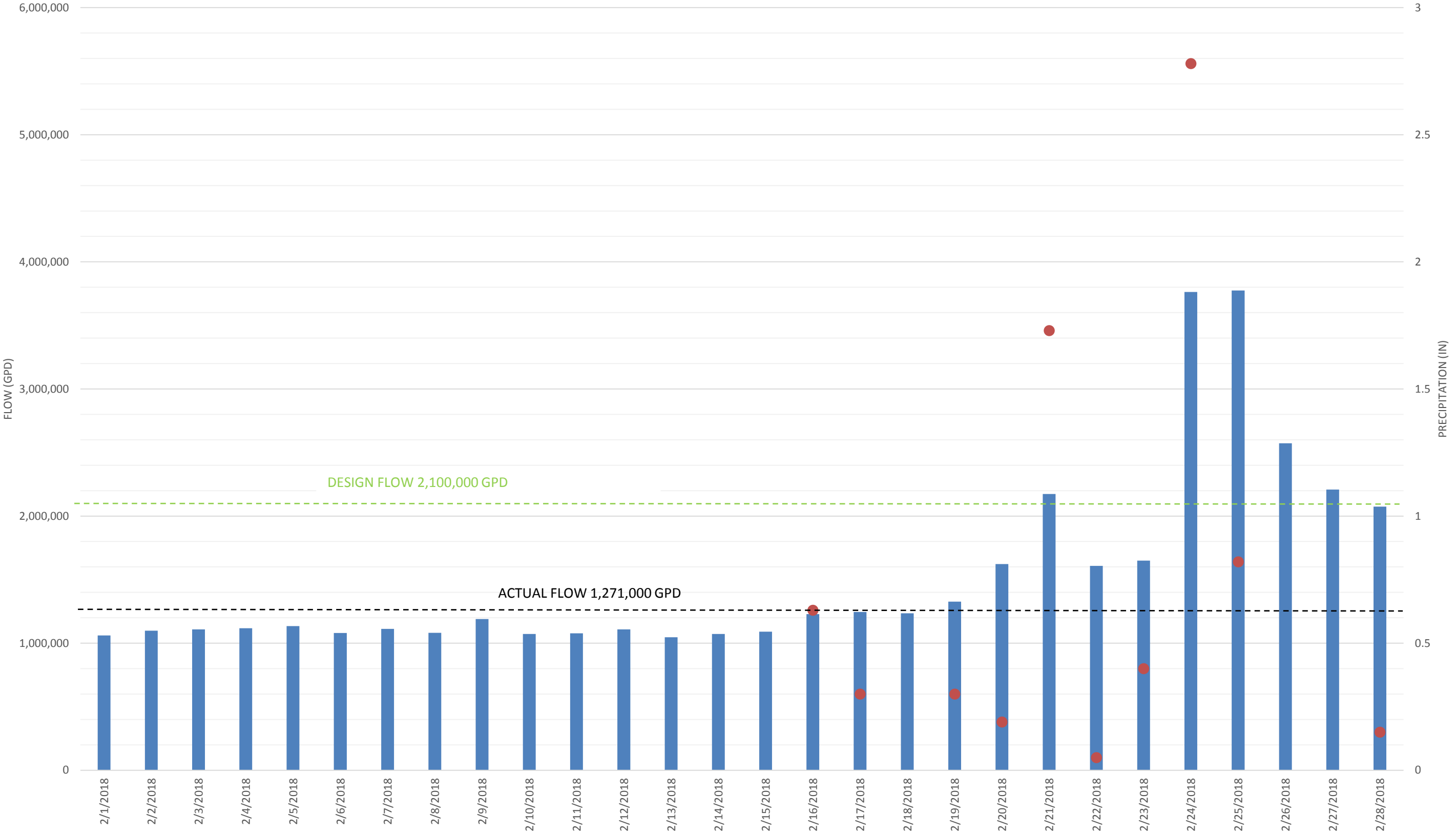


NORTH WASTEWATER TREATMENT PLANT DAILY FLOW



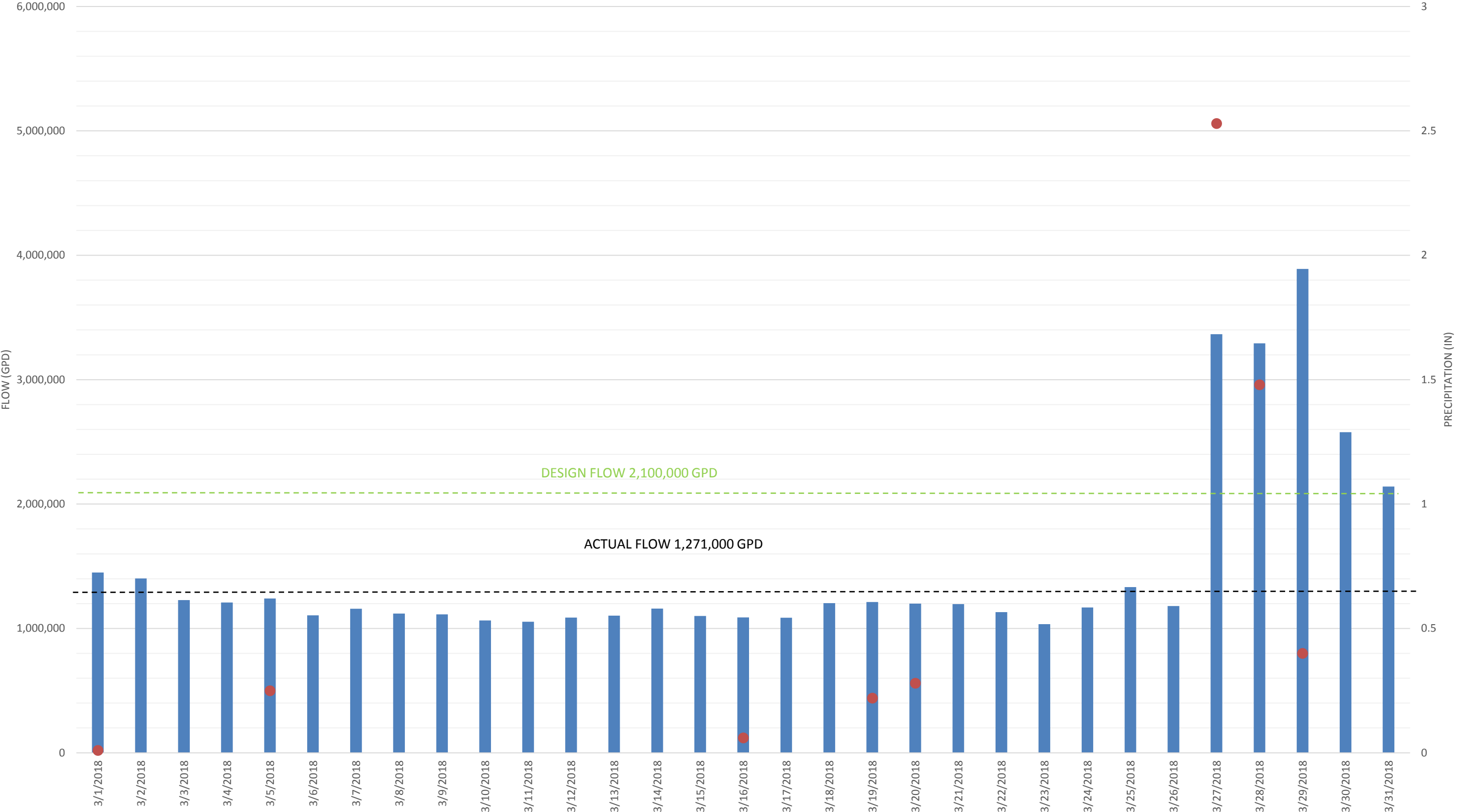
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation



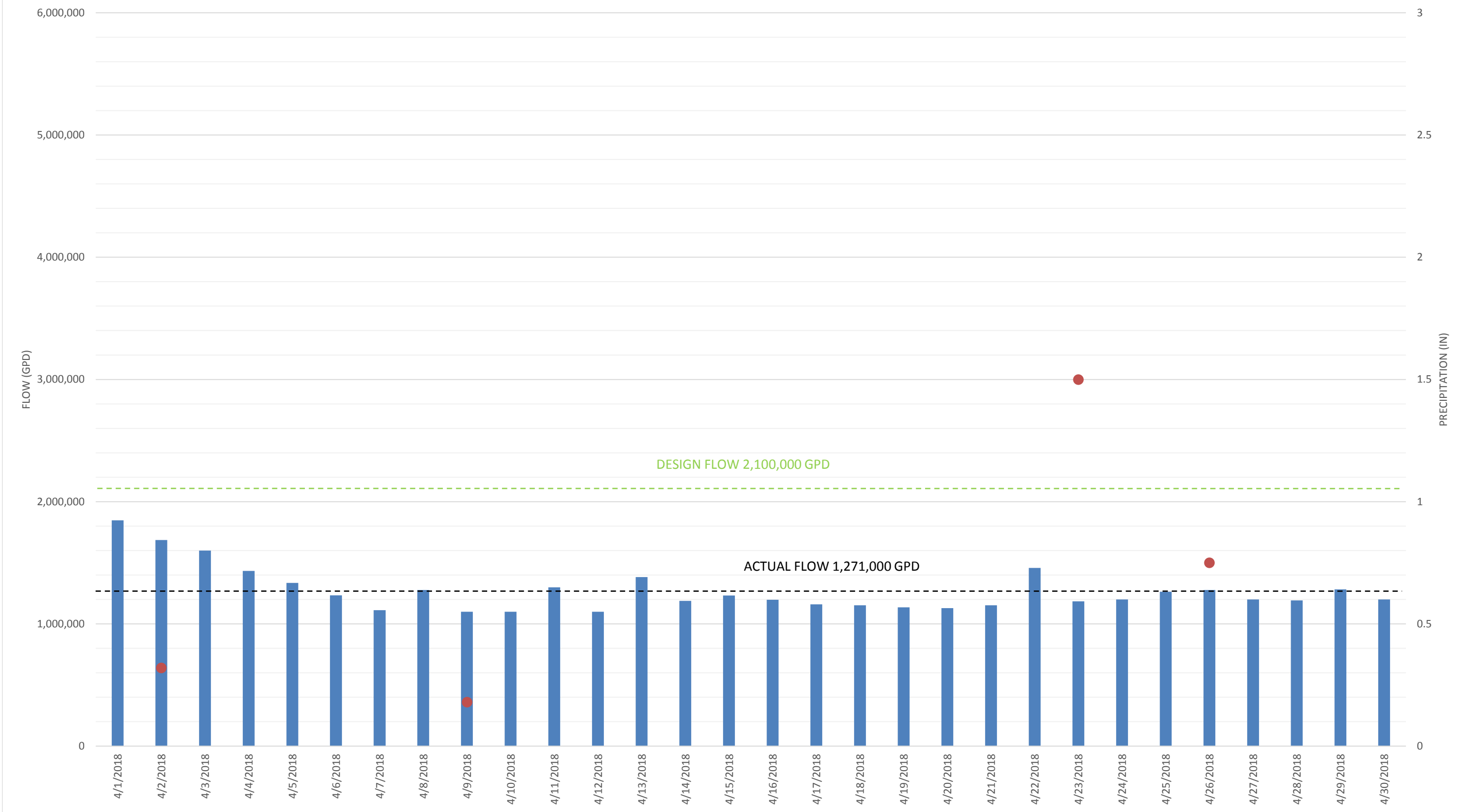
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



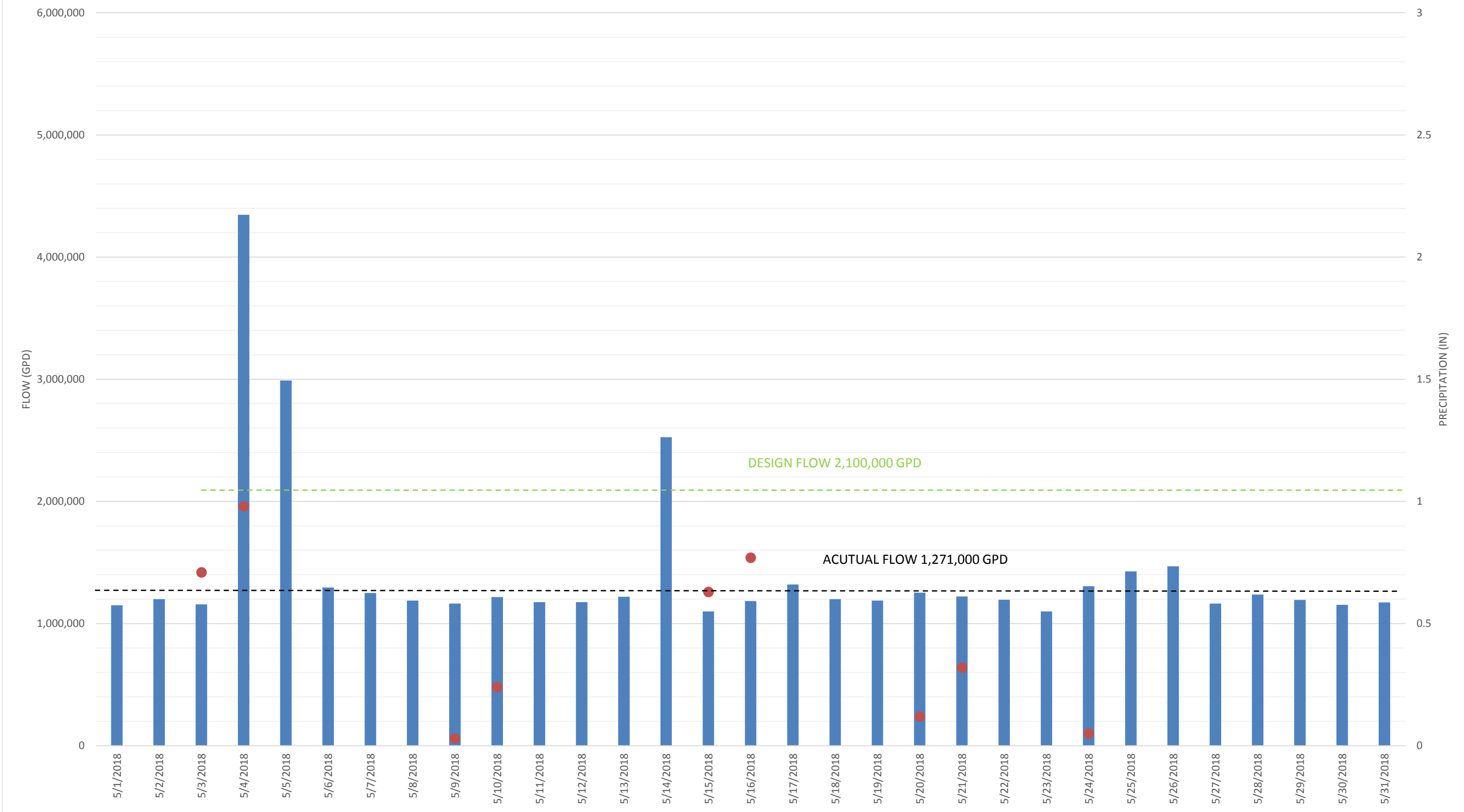
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



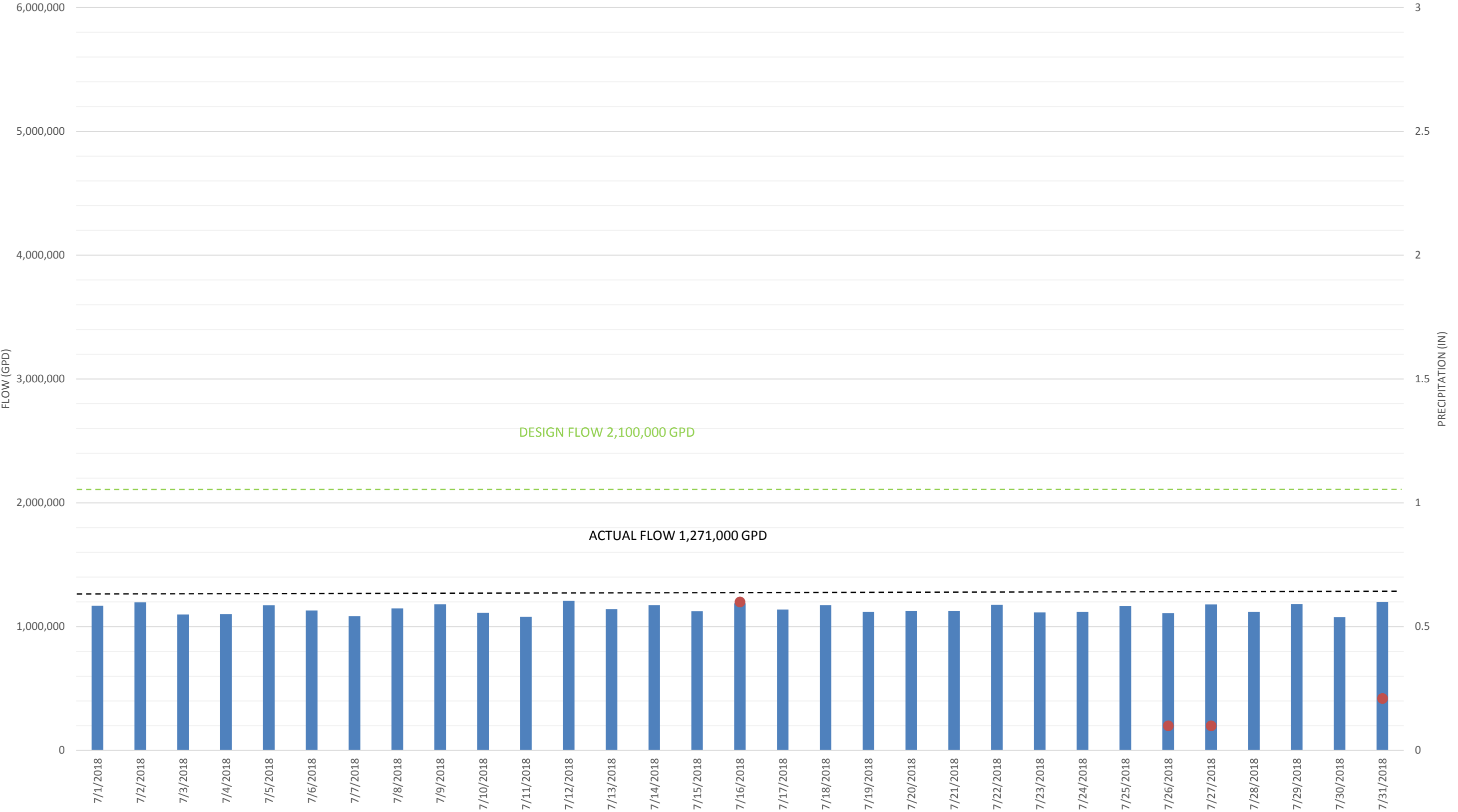
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



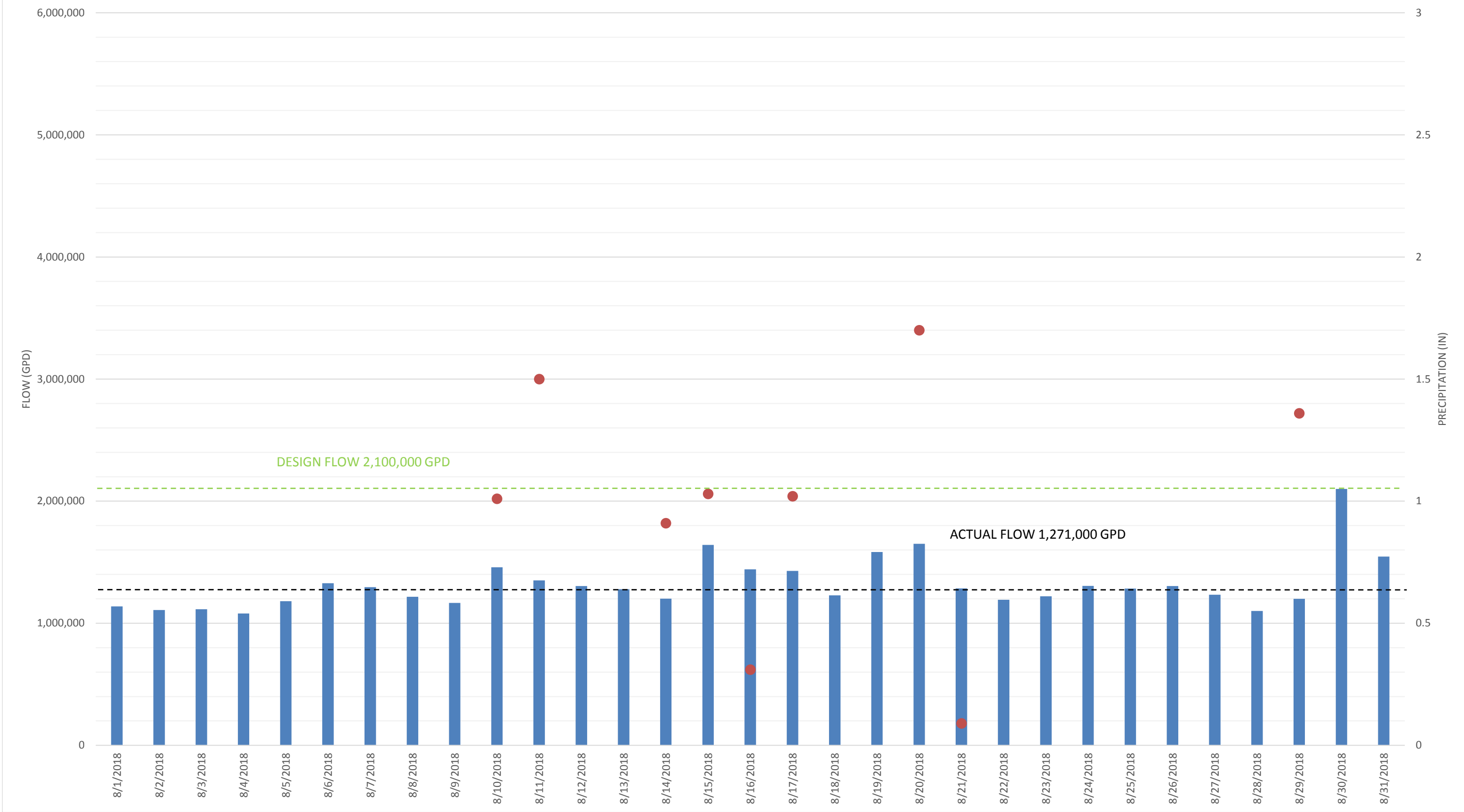
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



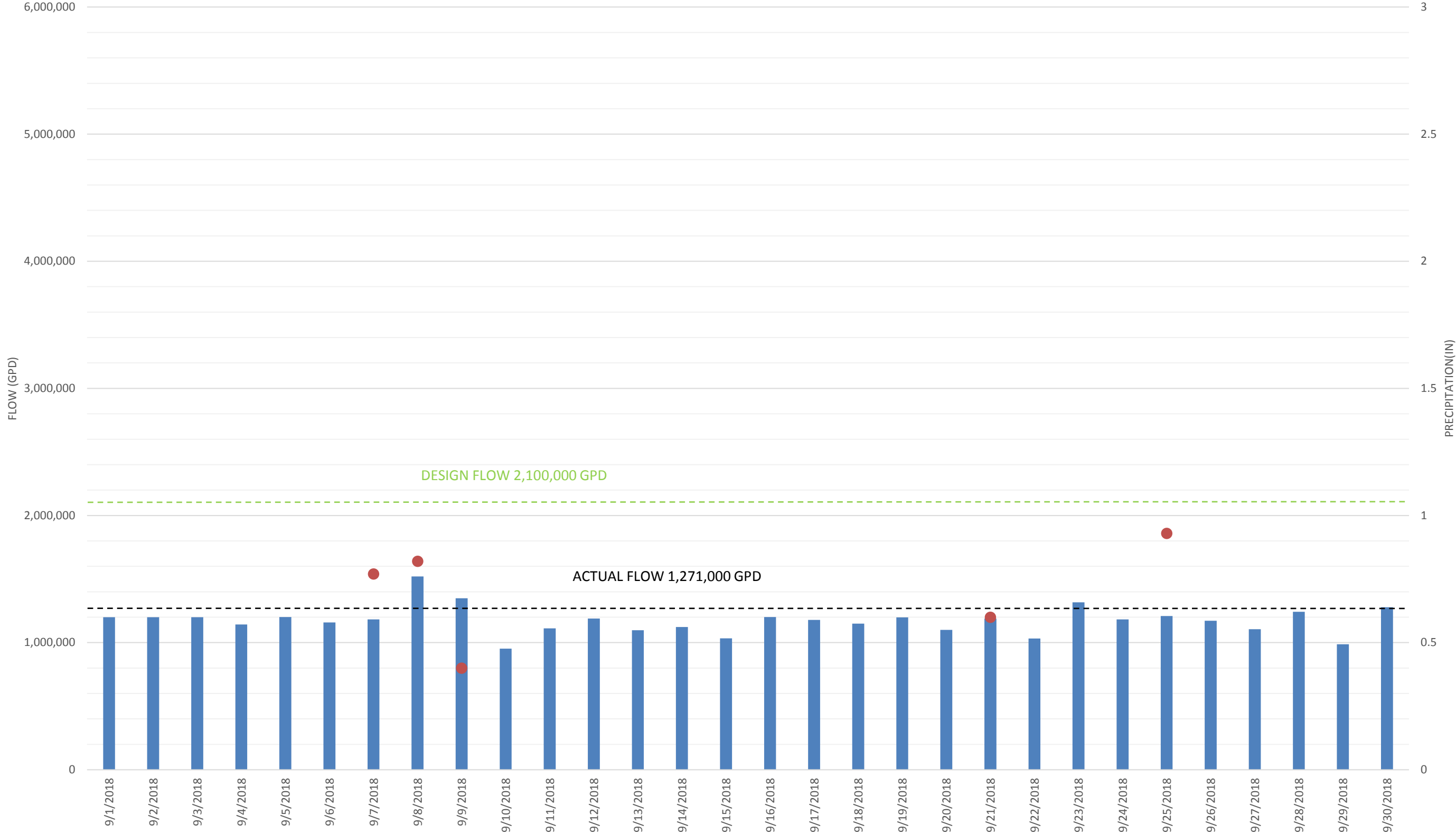
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation

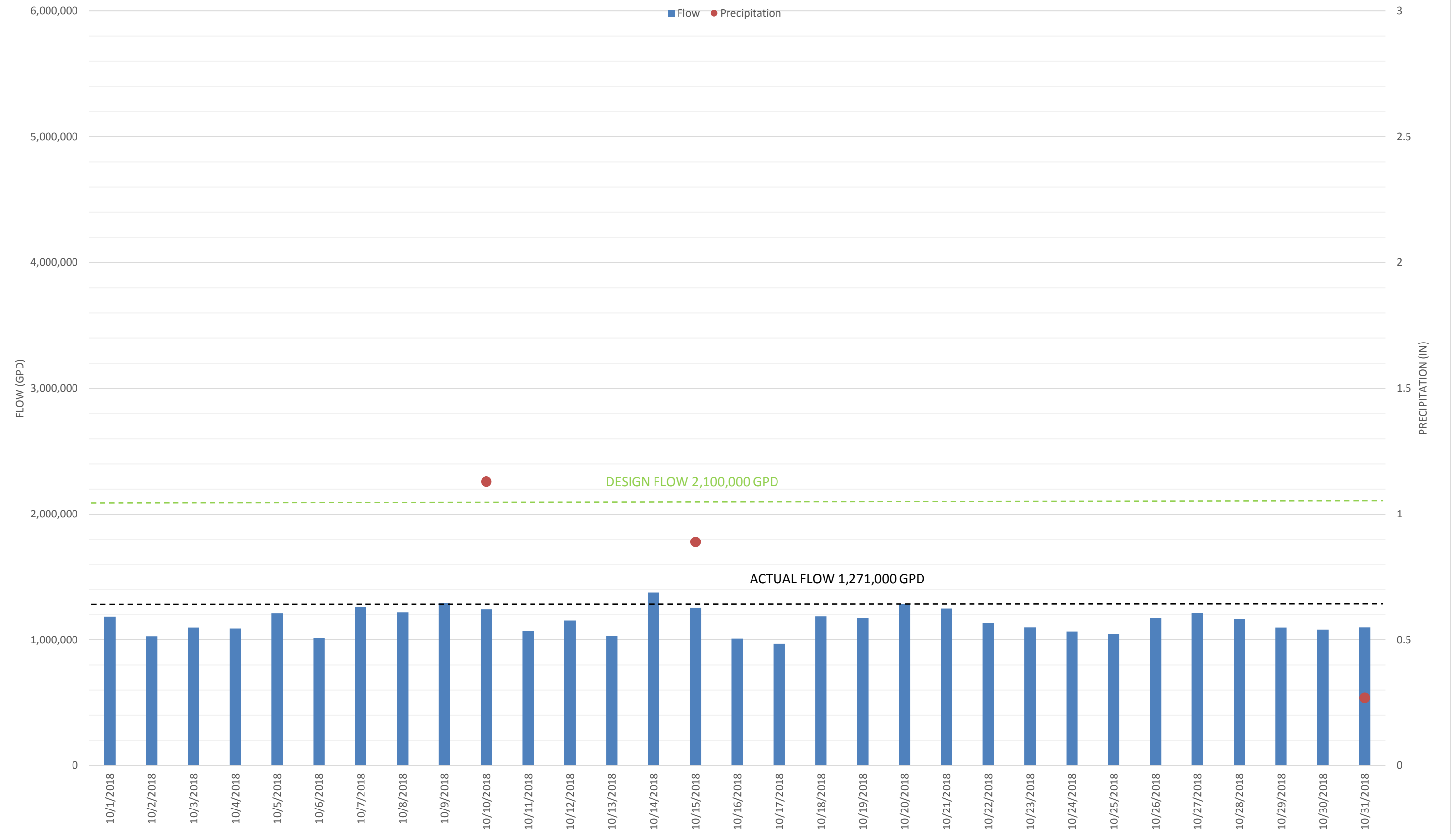


NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

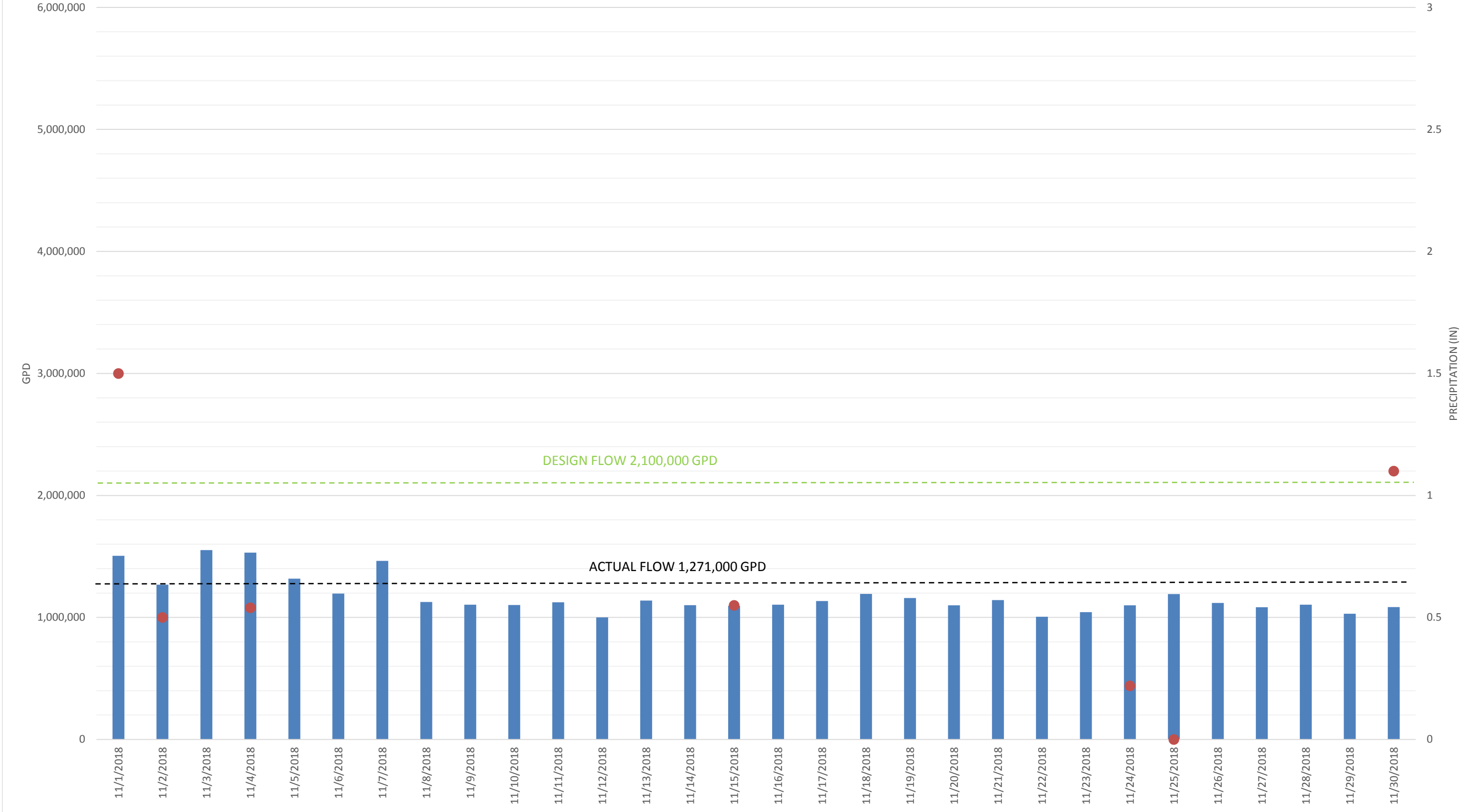


NORTH WASTEWATER TREATMENT PLANT DAILY FLOW



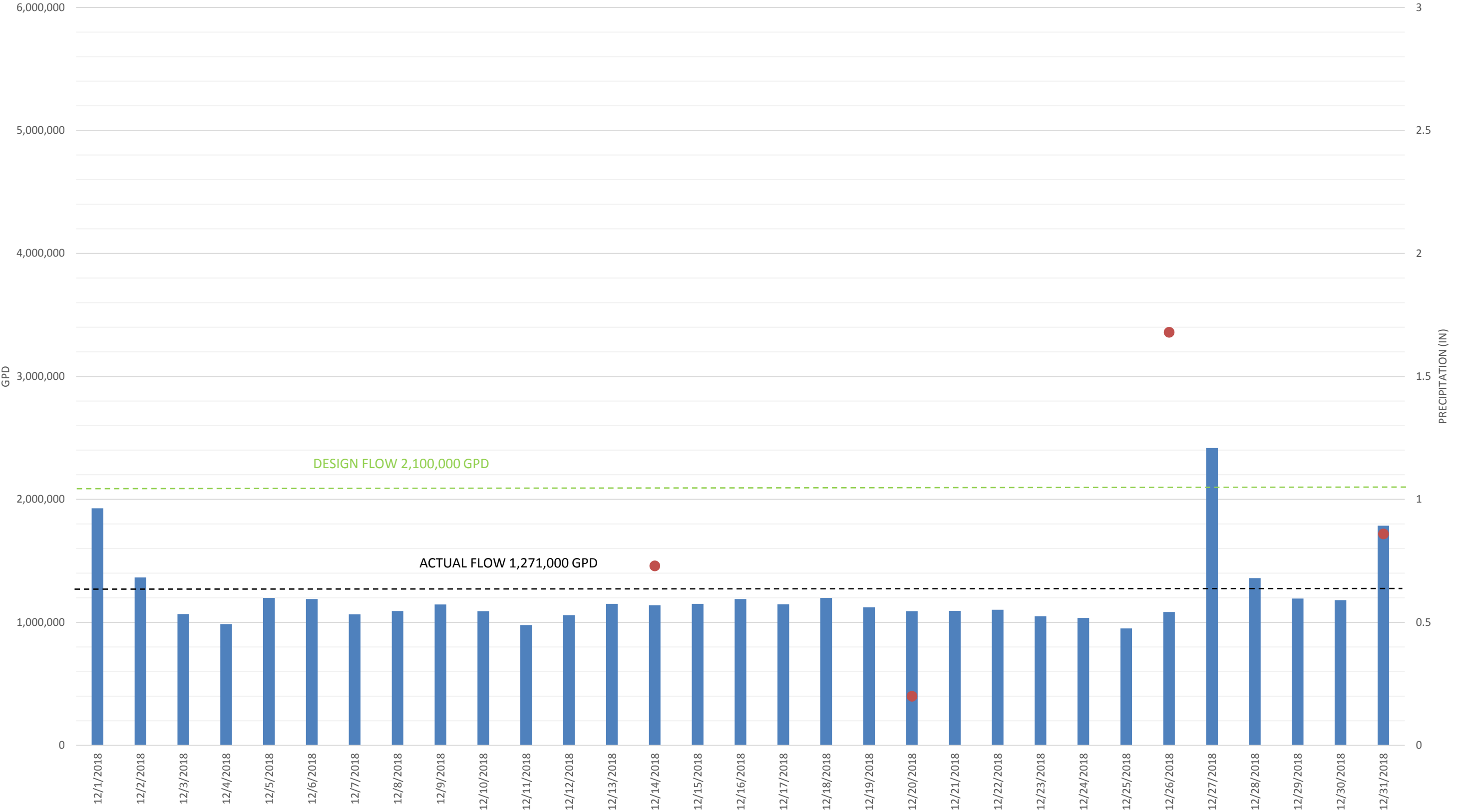
NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



NORTH WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

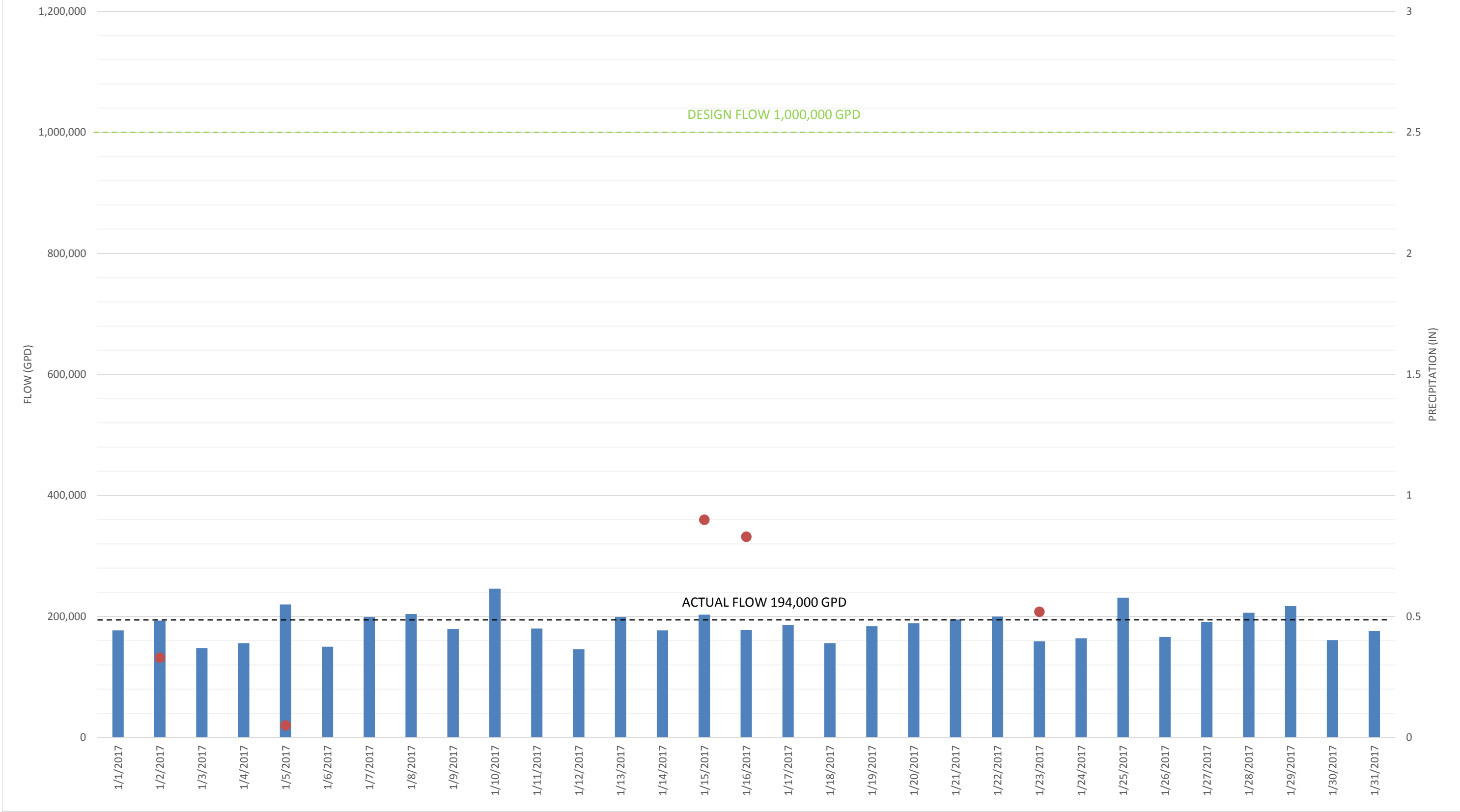


APPENDIX H
ELK VALLEY WWTP FLOW DATA

DRAFT

ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation

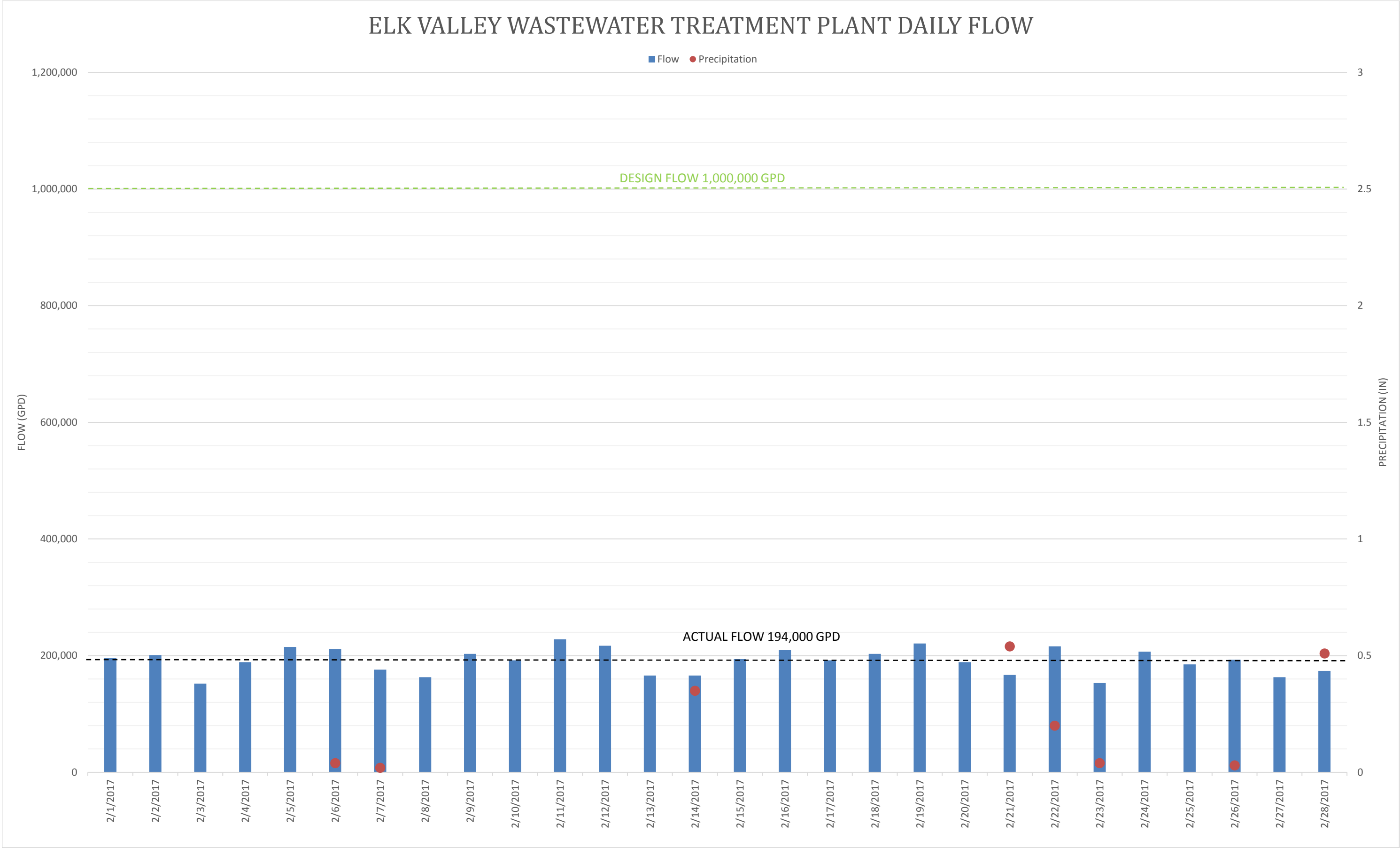


ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

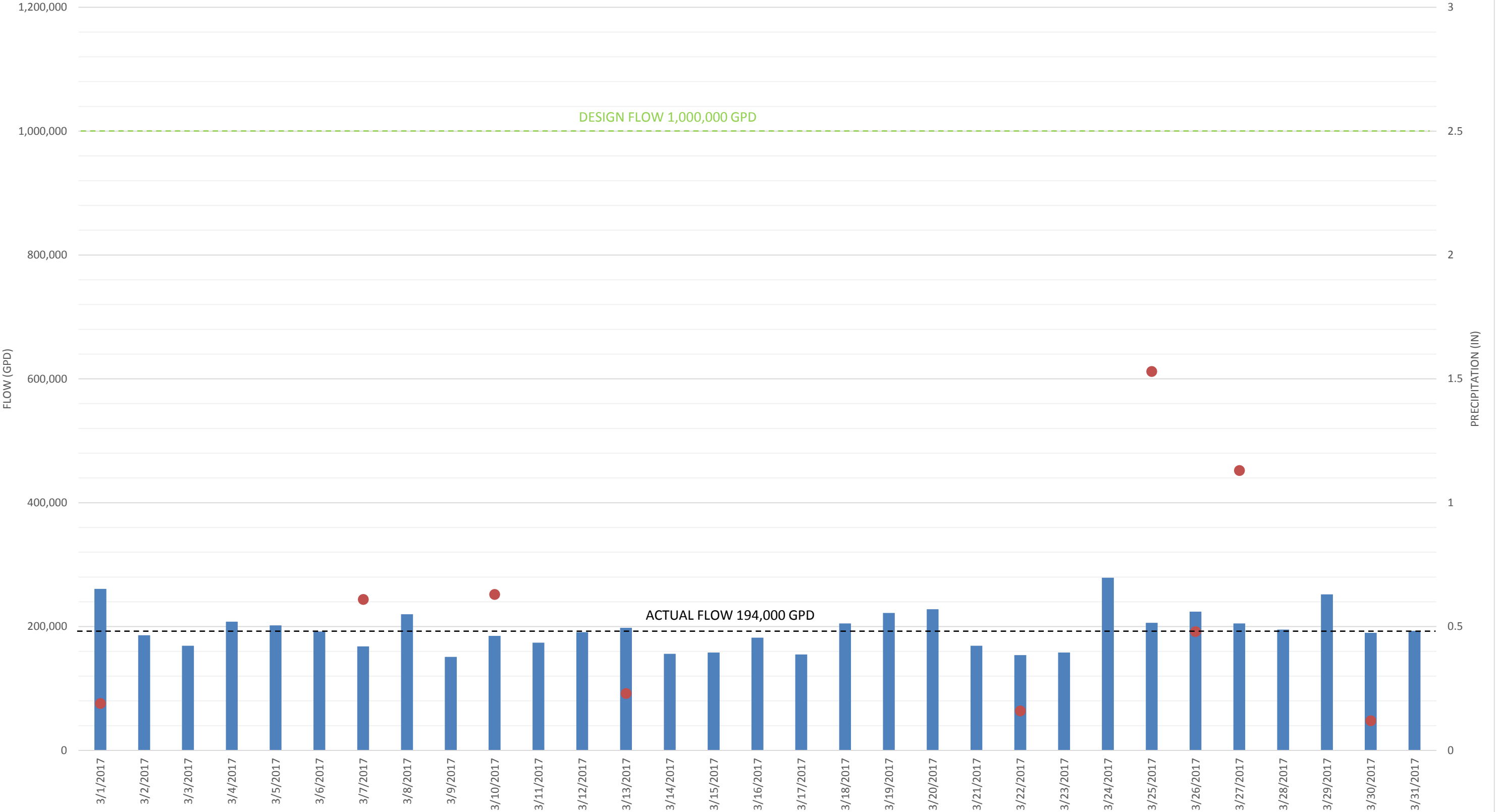
DESIGN FLOW 1,000,000 GPD

ACTUAL FLOW 194,000 GPD



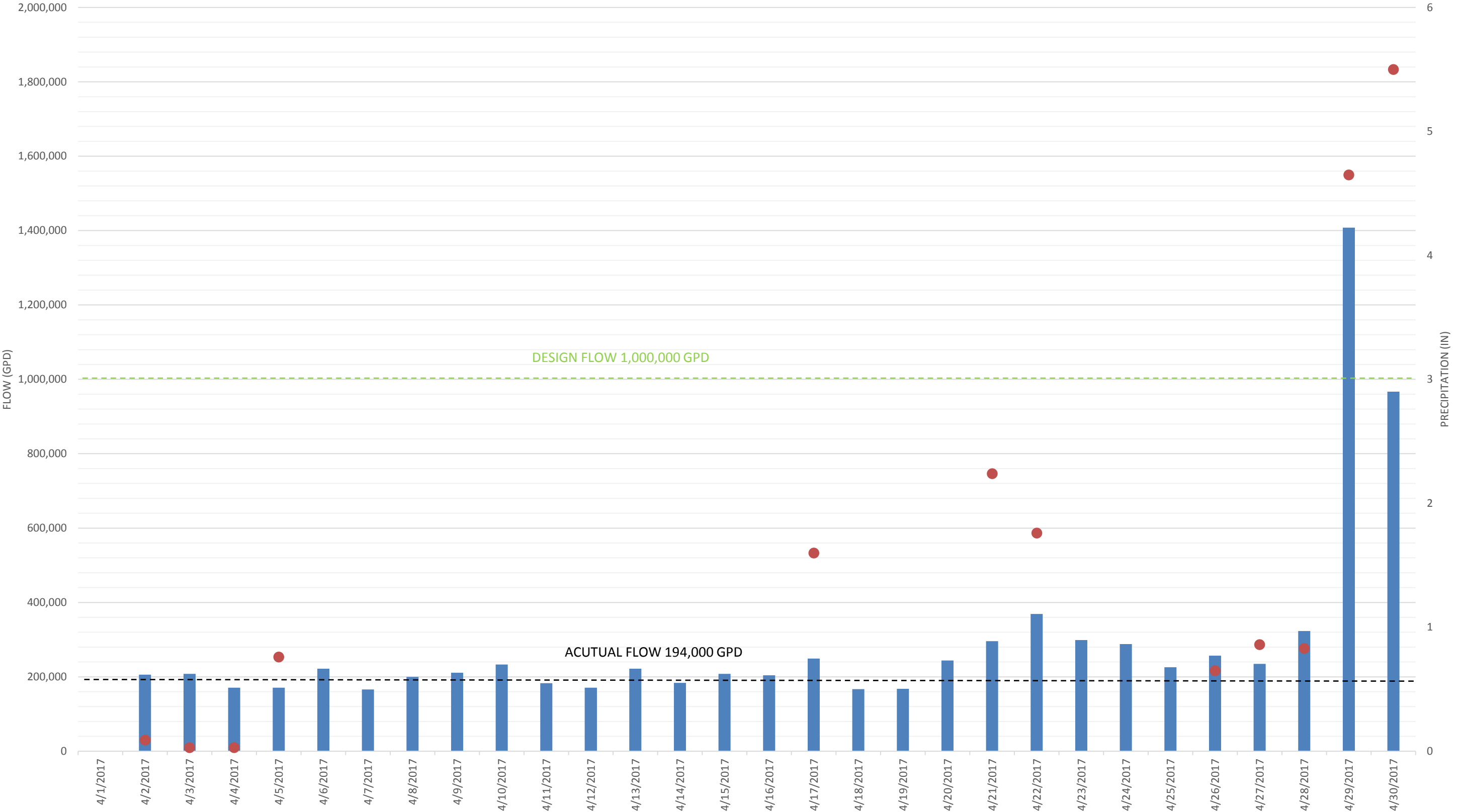
ELK VALLEY WASTEWATER REATMENT PLANT DAILY FLOW

■ Flow ● Preciptation



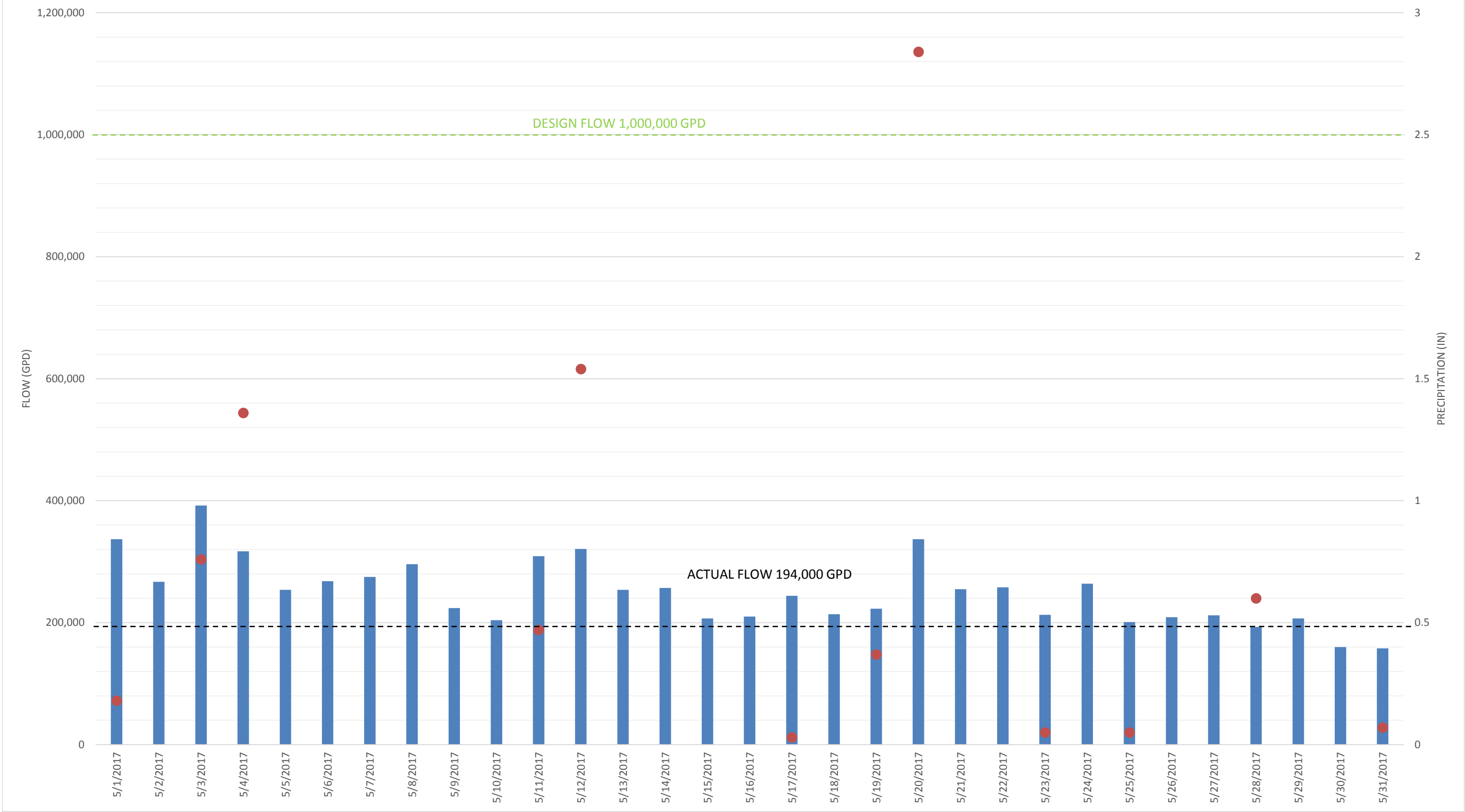
ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

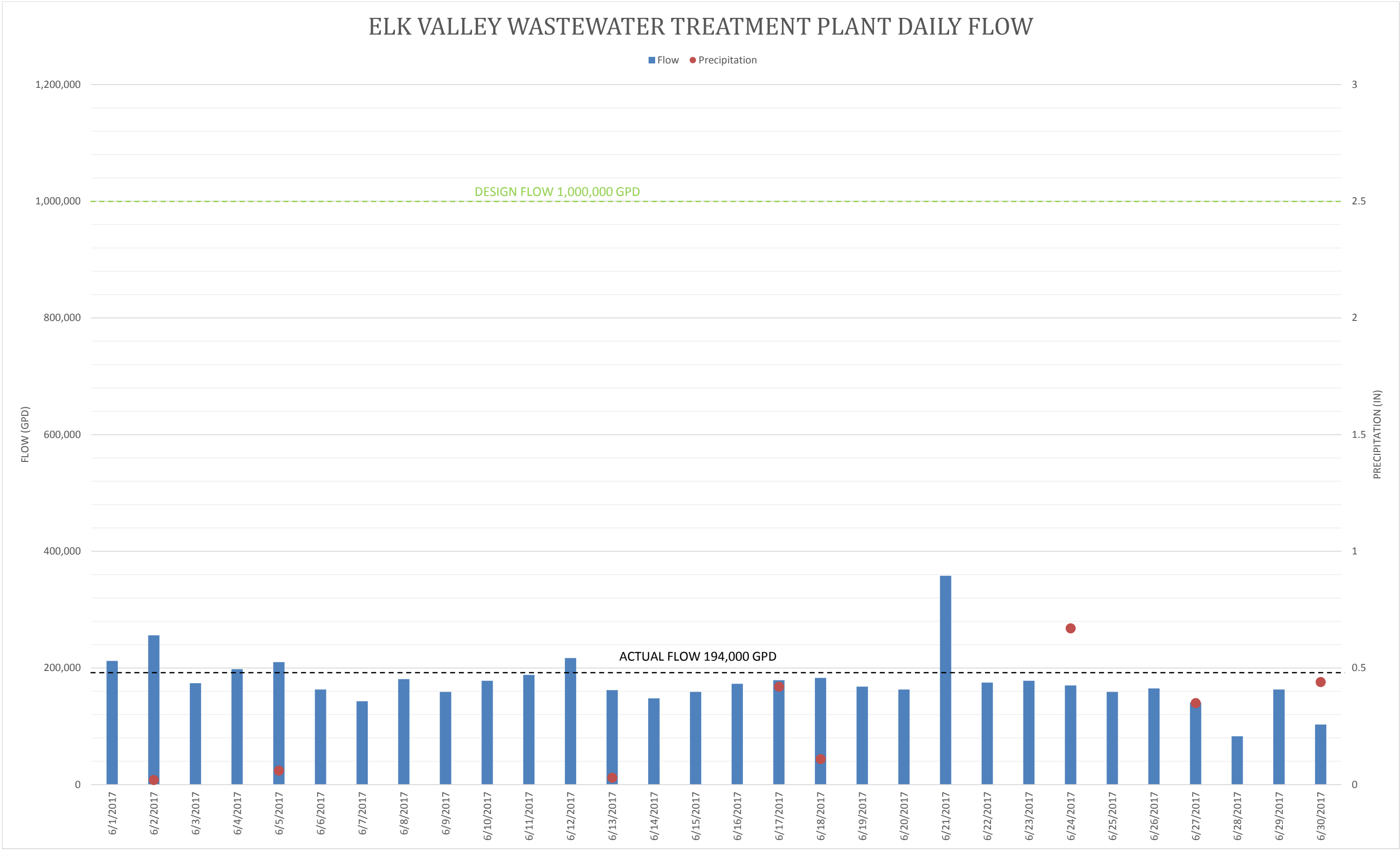


ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation

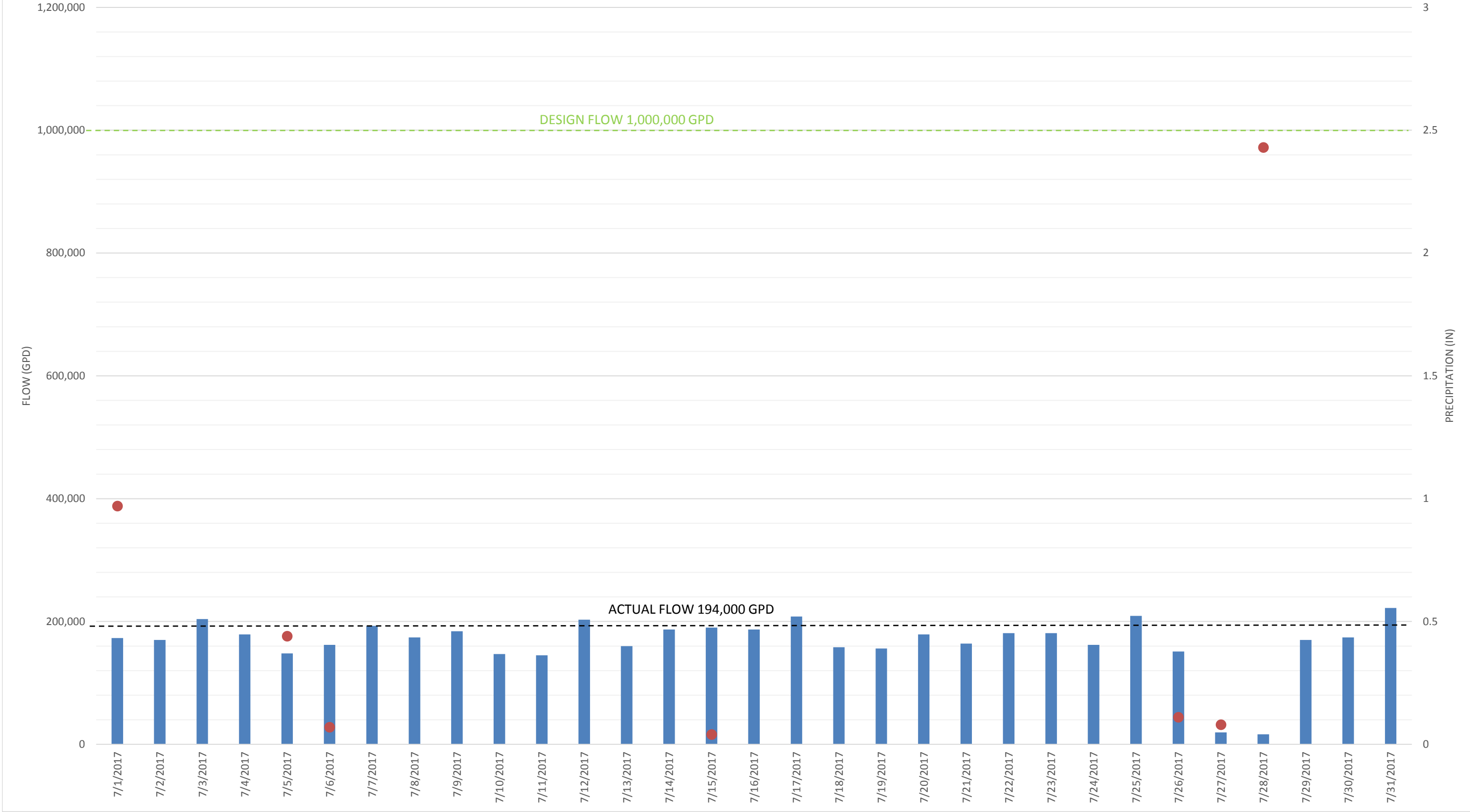
DESIGN FLOW 1,000,000 GPD

ACTUAL FLOW 194,000 GPD



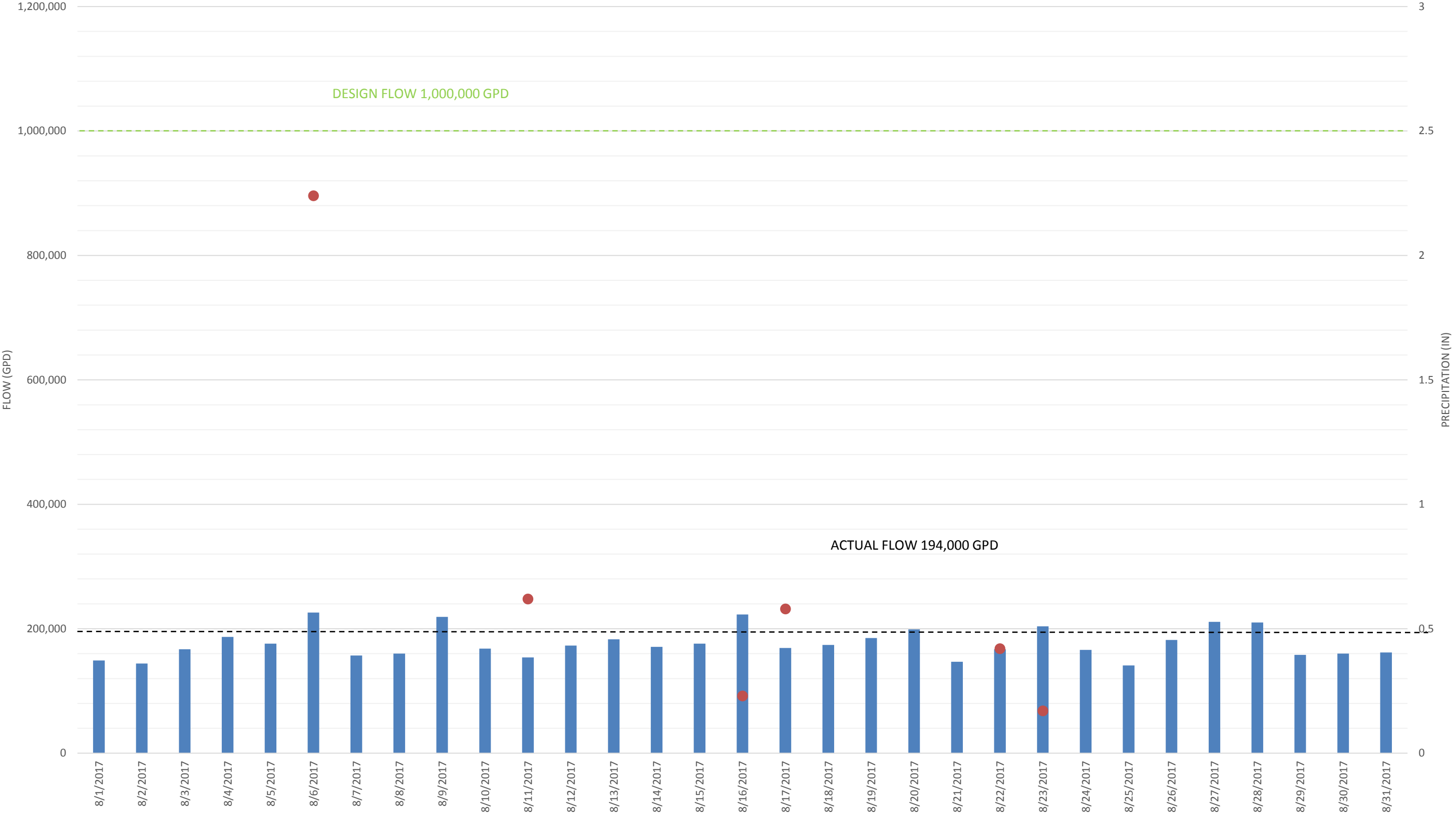
ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

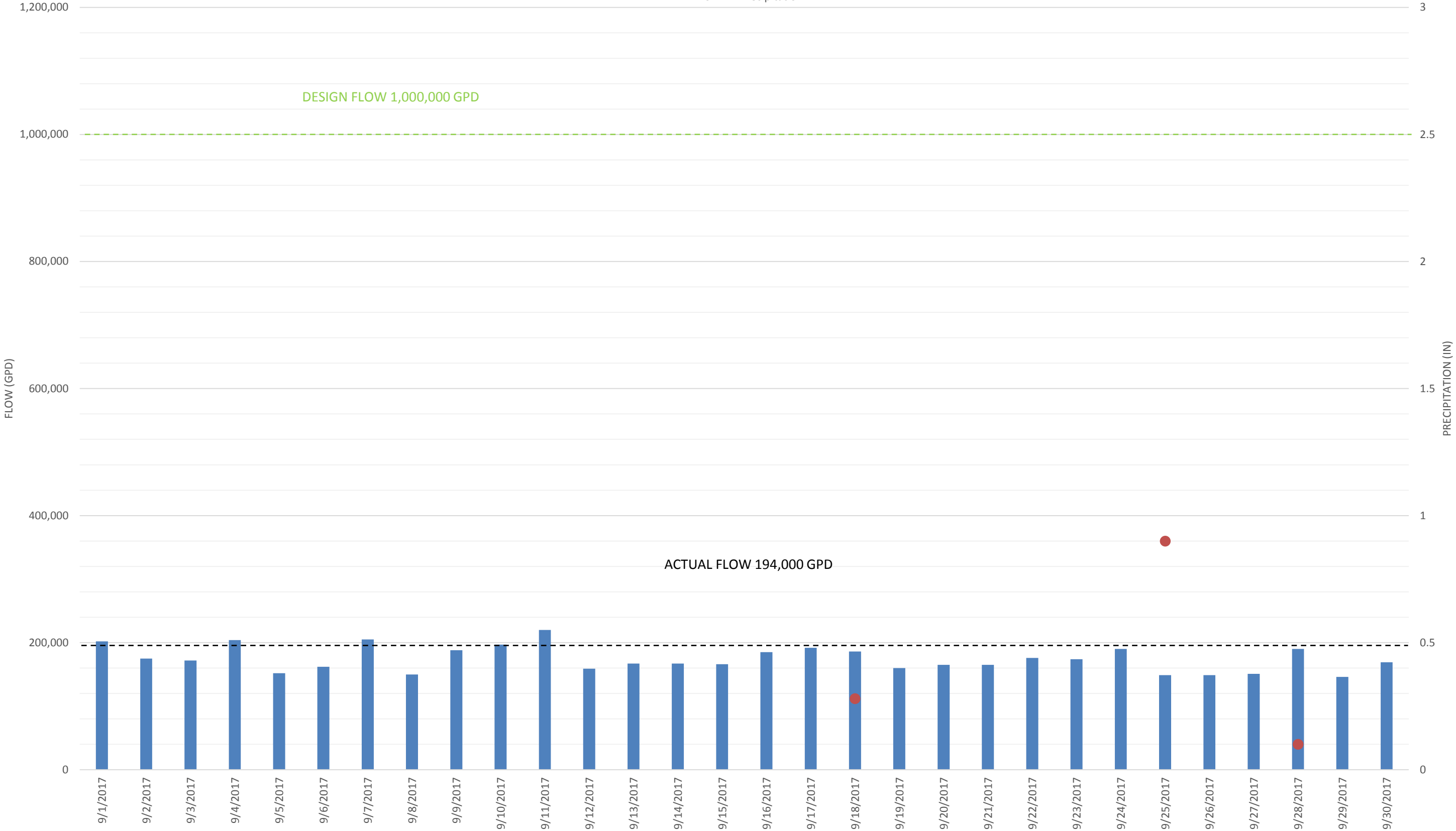
■ Flow ● Precipitation

DESIGN FLOW 1,000,000 GPD

ACTUAL FLOW 194,000 GPD

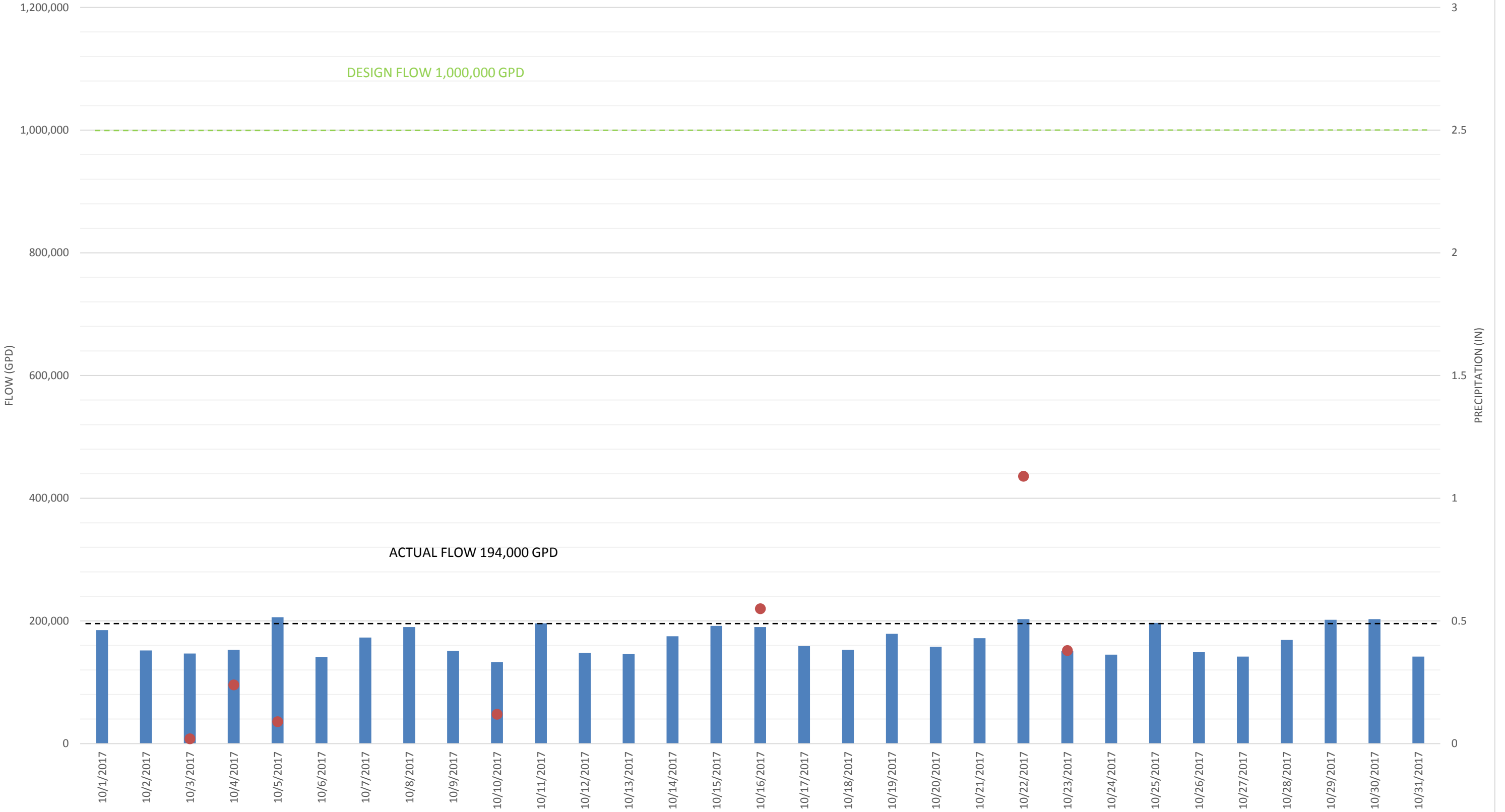
FLOW (GPD)

PRECIPITATION (IN)



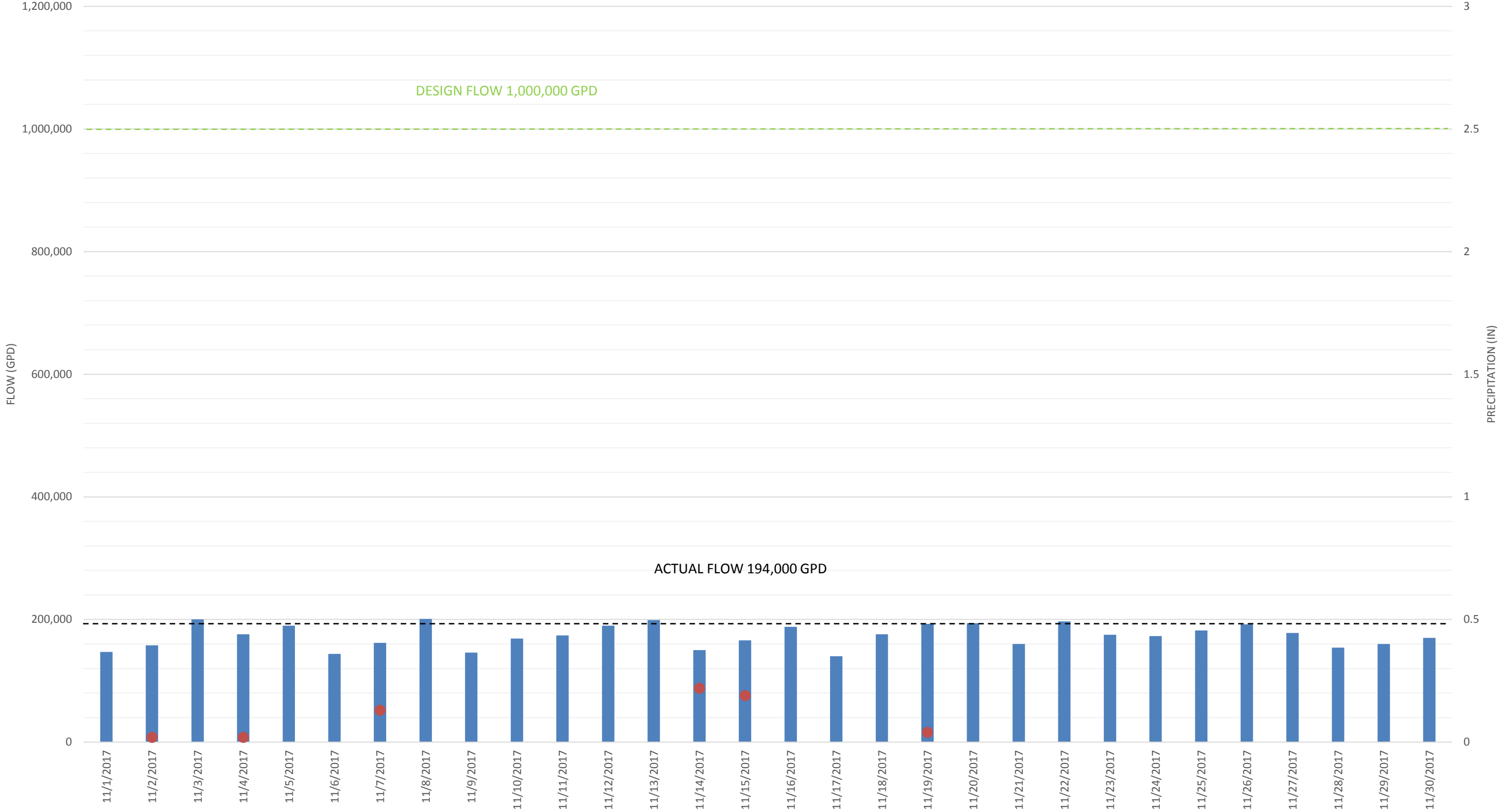
ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation



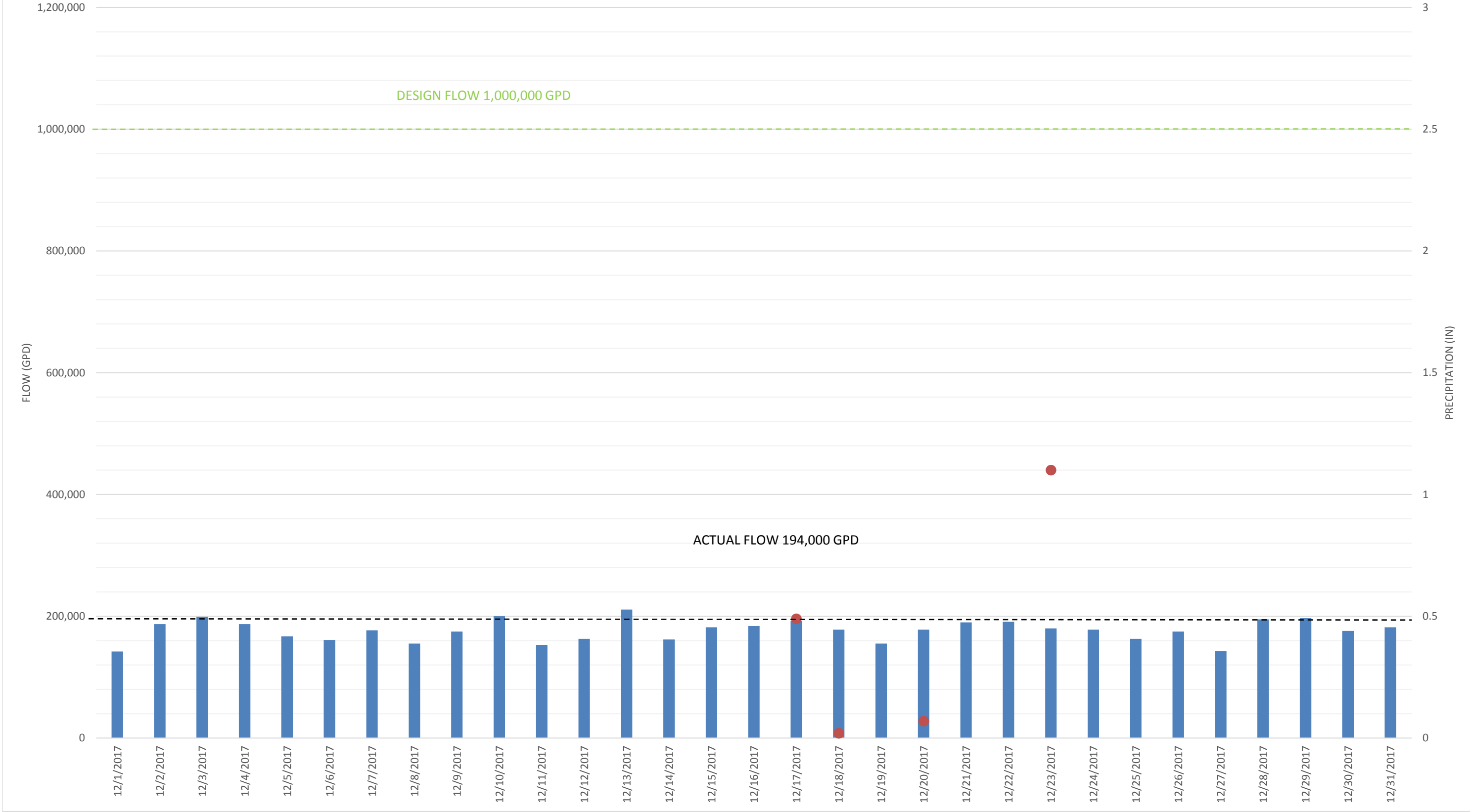
ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

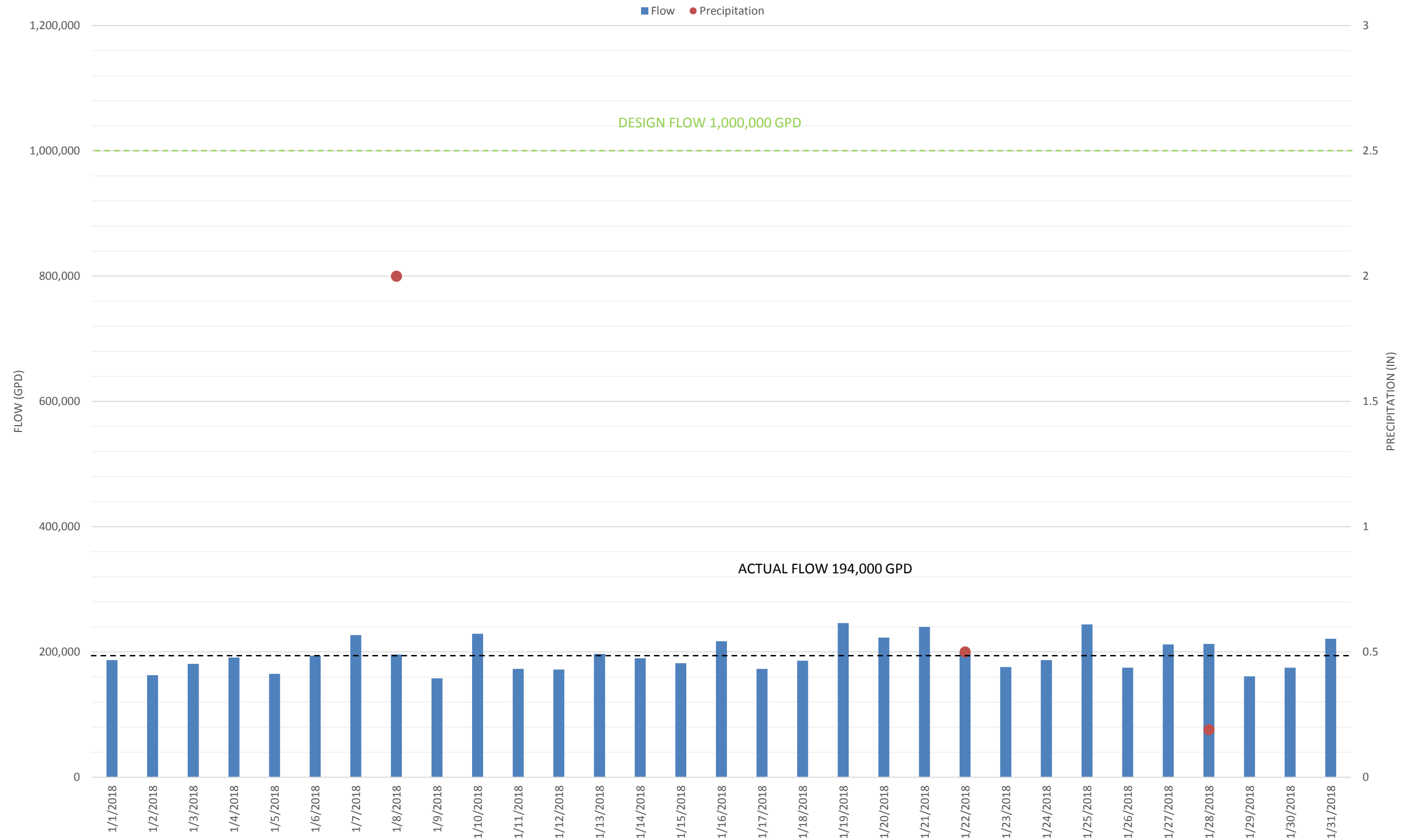


ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

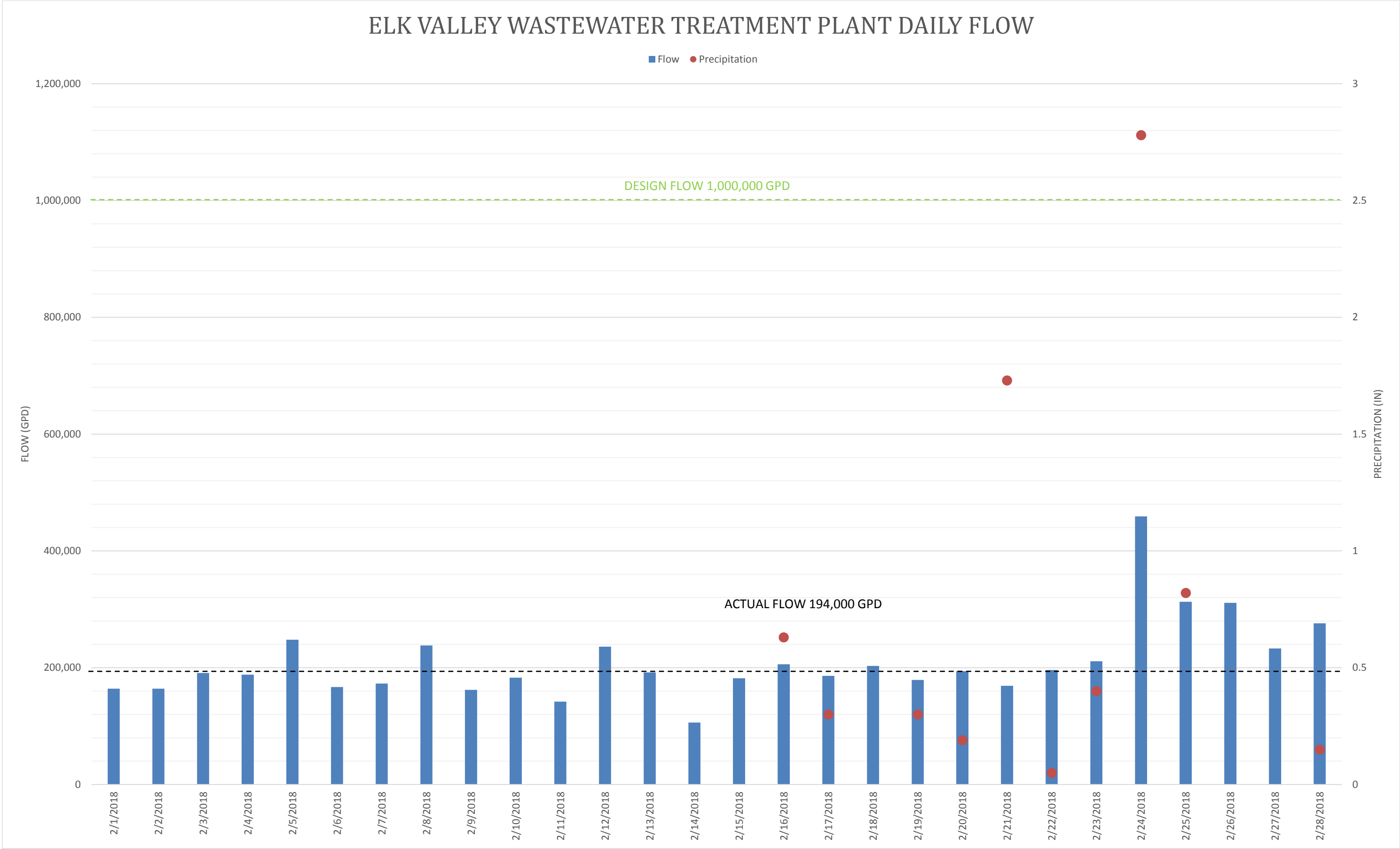


ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

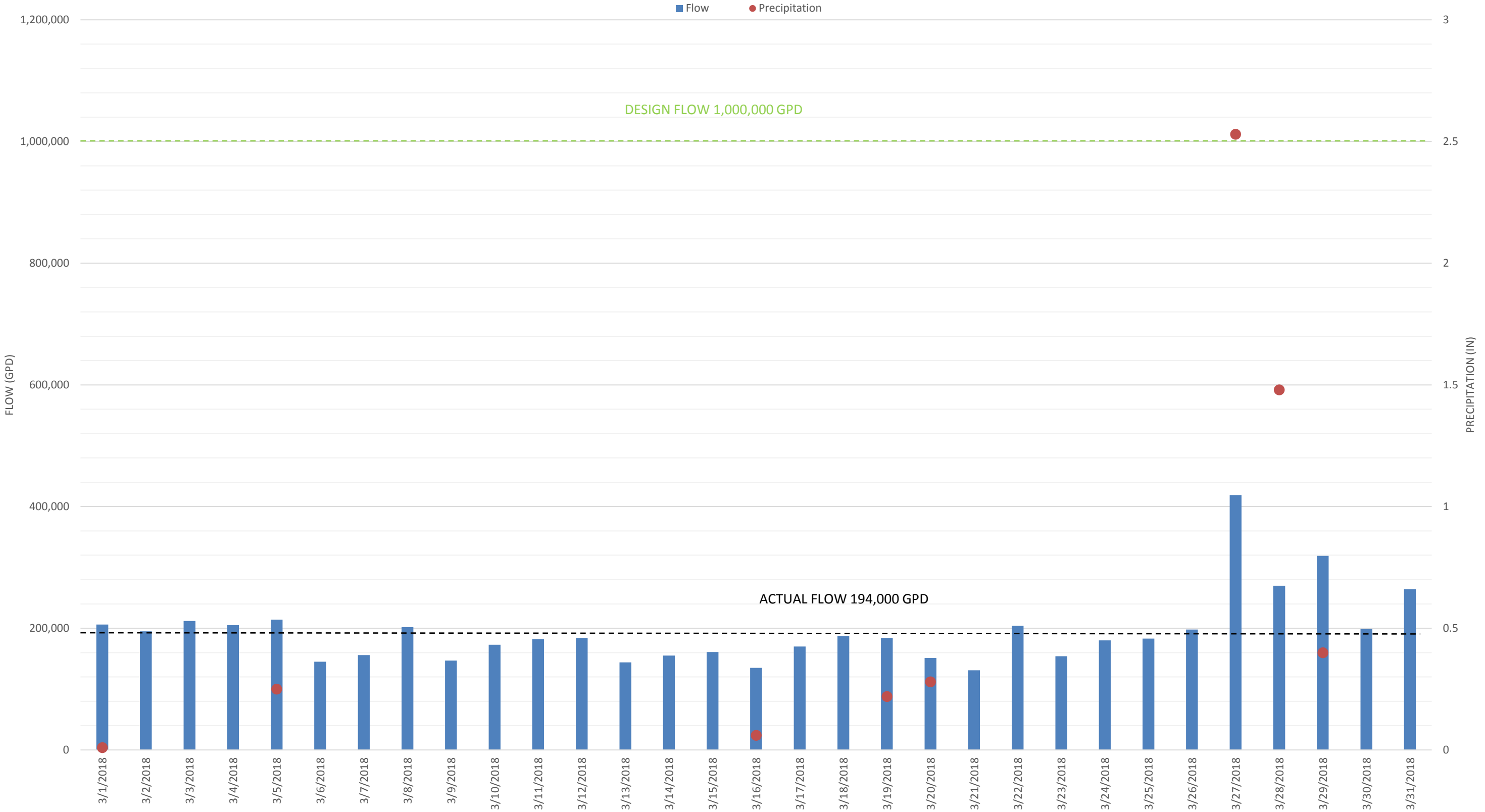
Flow Precipitation

DESIGN FLOW 1,000,000 GPD

ACTUAL FLOW 194,000 GPD



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

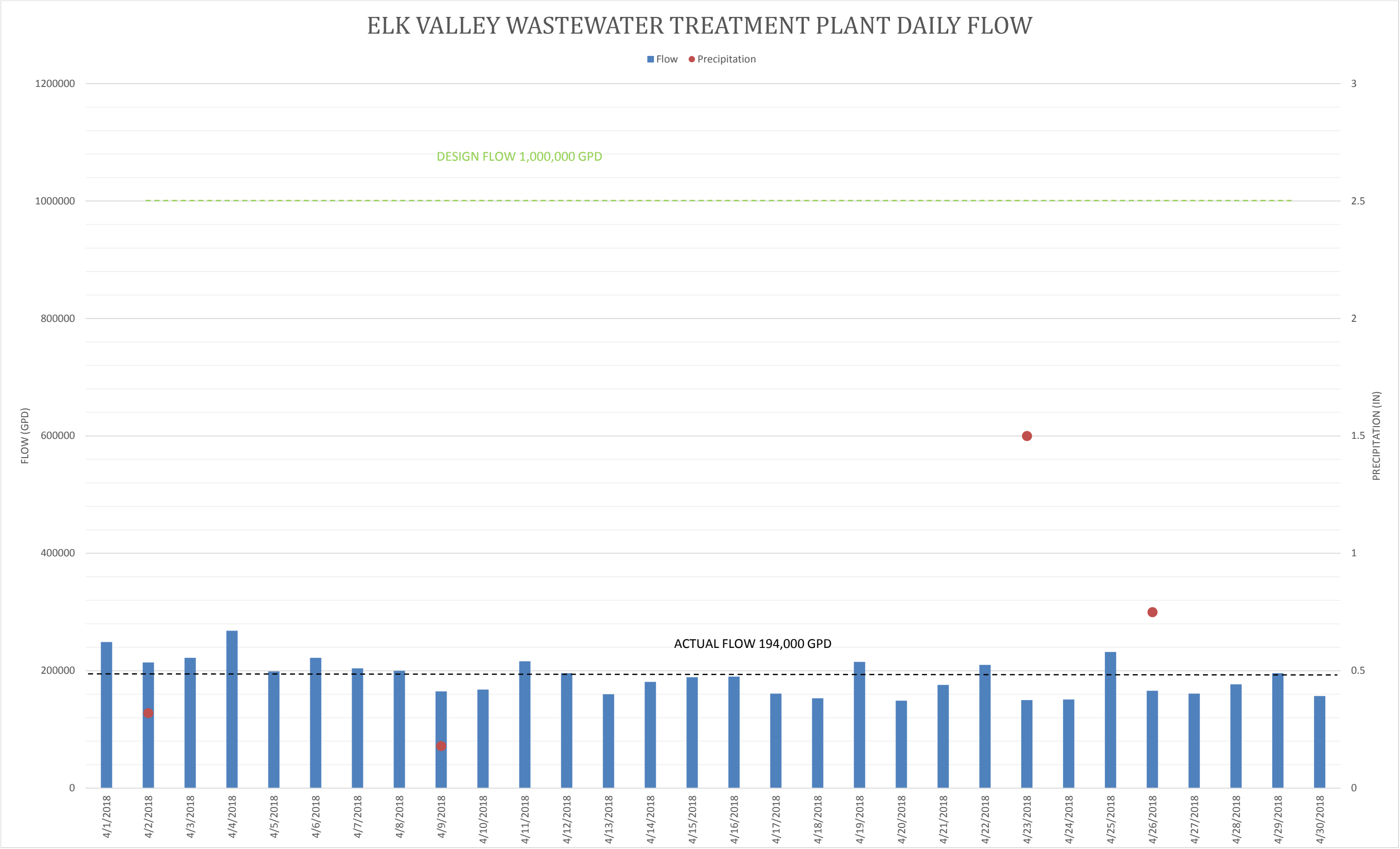
Flow Precipitation

DESIGN FLOW 1,000,000 GPD

ACTUAL FLOW 194,000 GPD

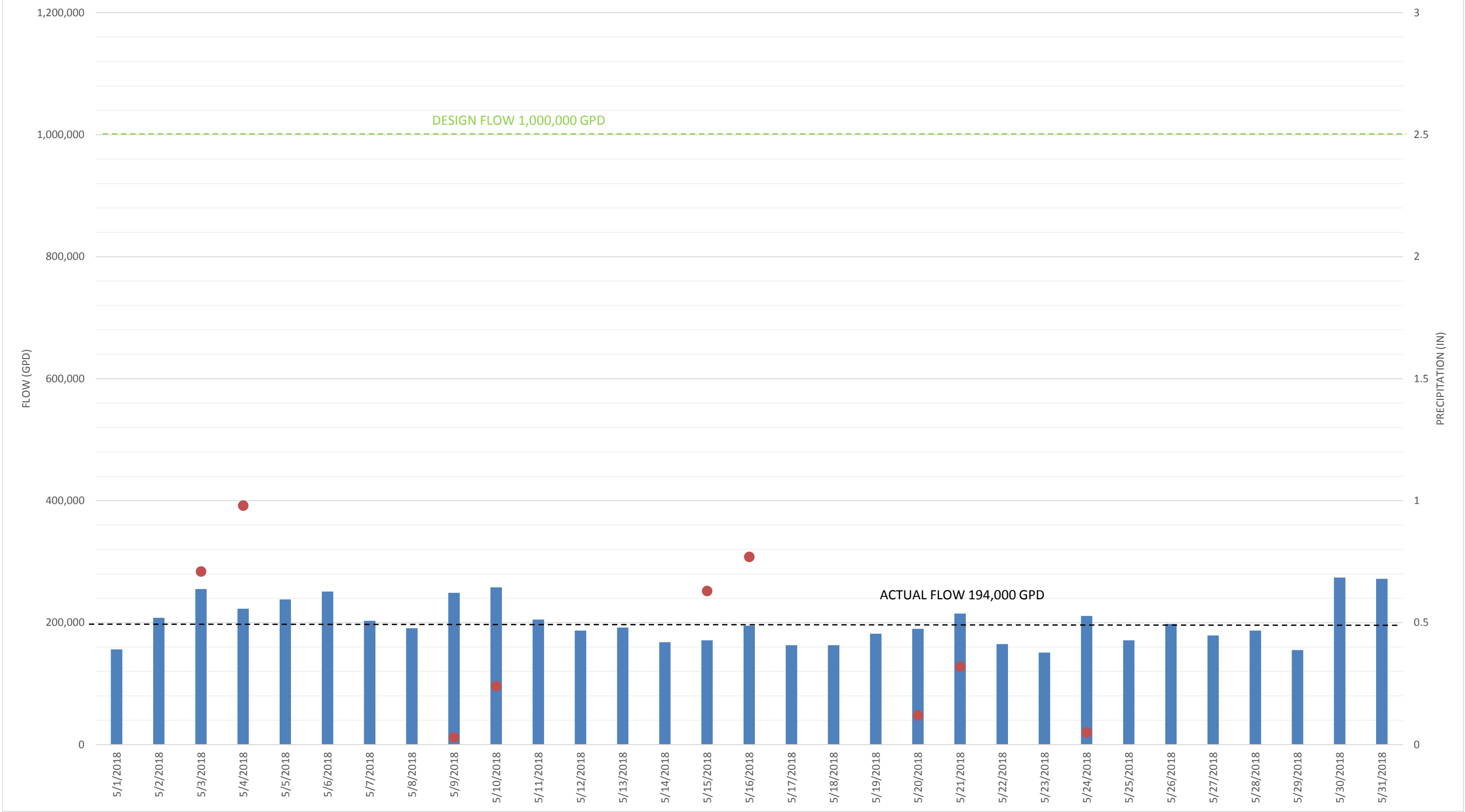
FLOW (GPD)

PRECIPITATION (IN)



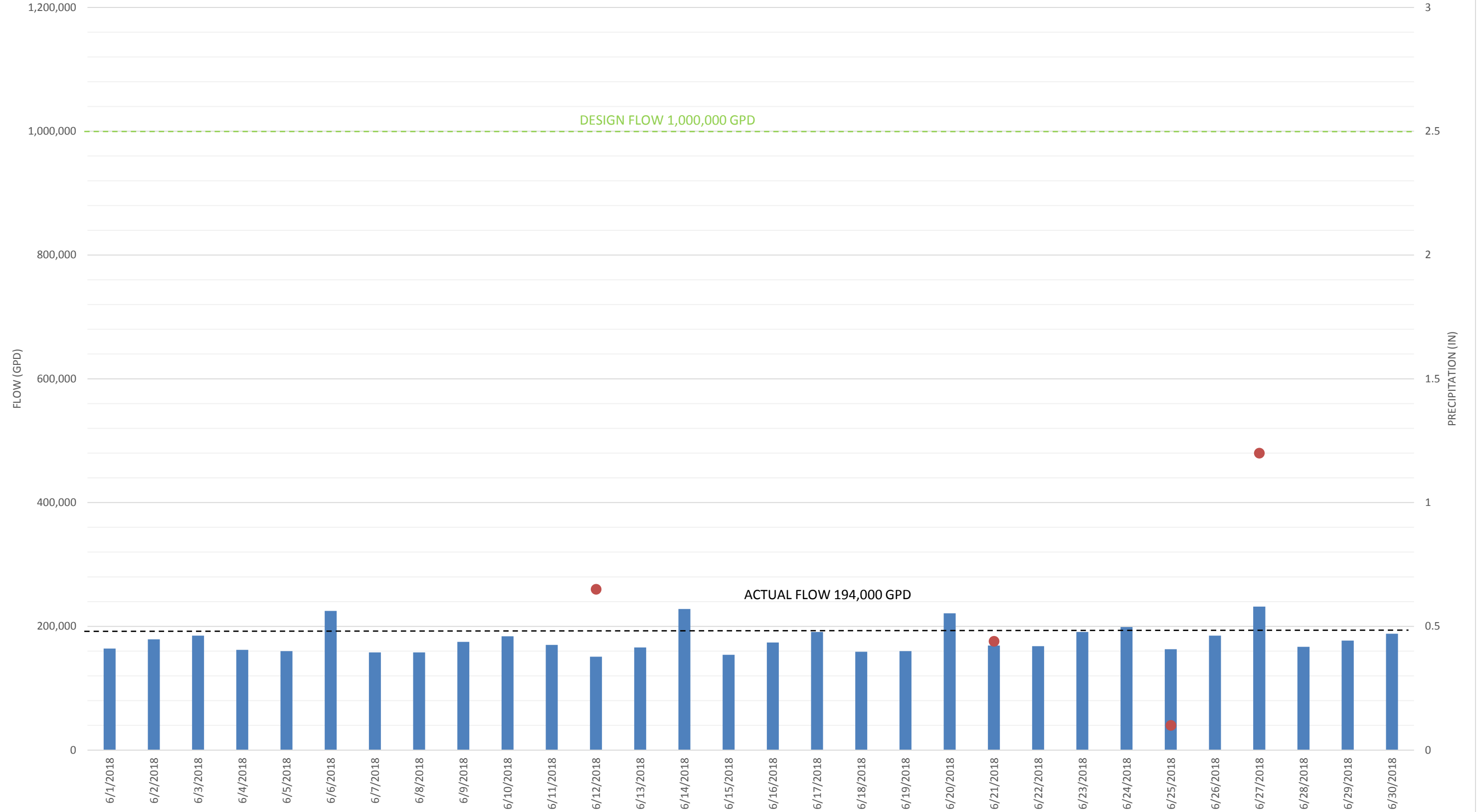
ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

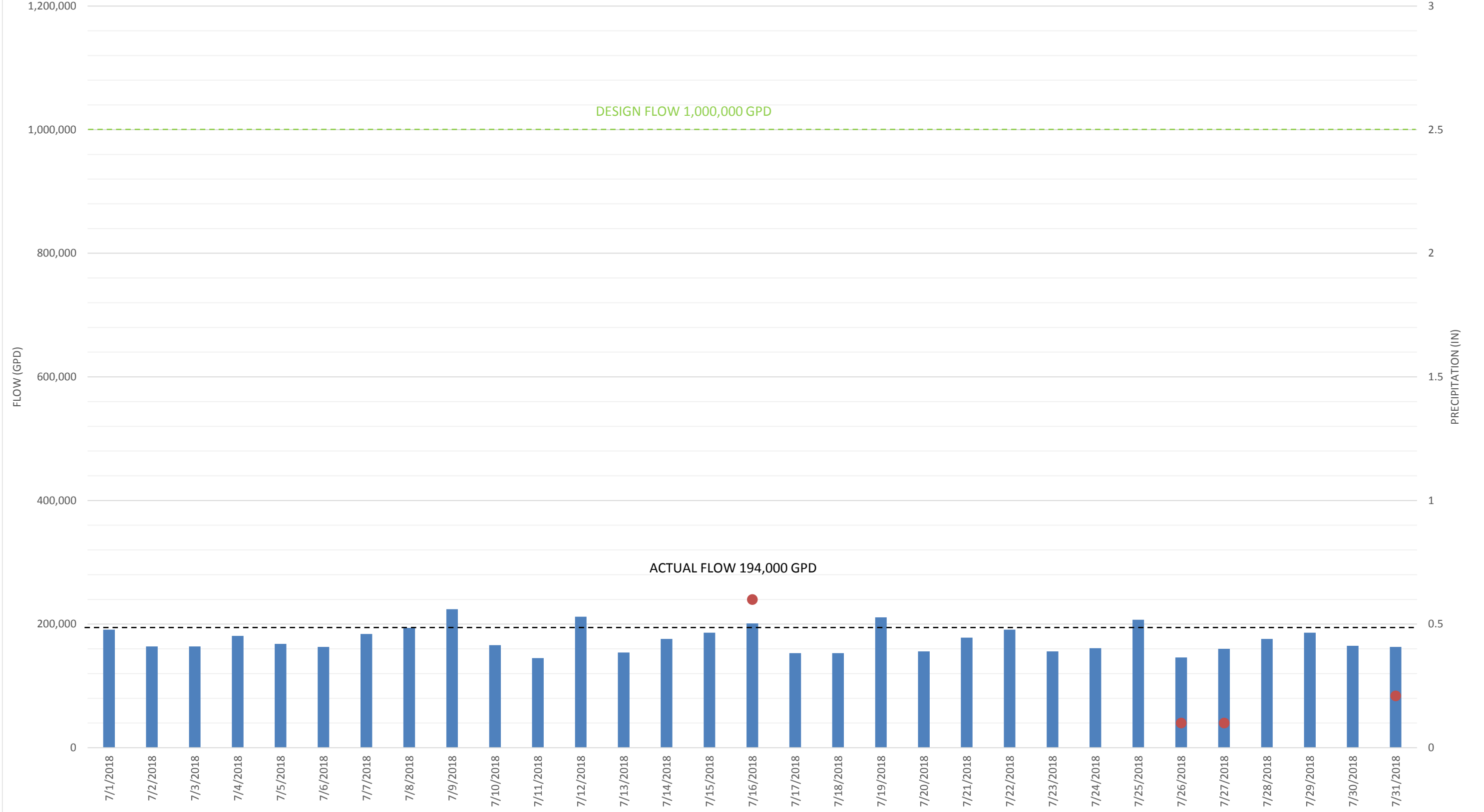


ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation

DESIGN FLOW 1,000,000 GPD

ACTUAL FLOW 194,000 GPD

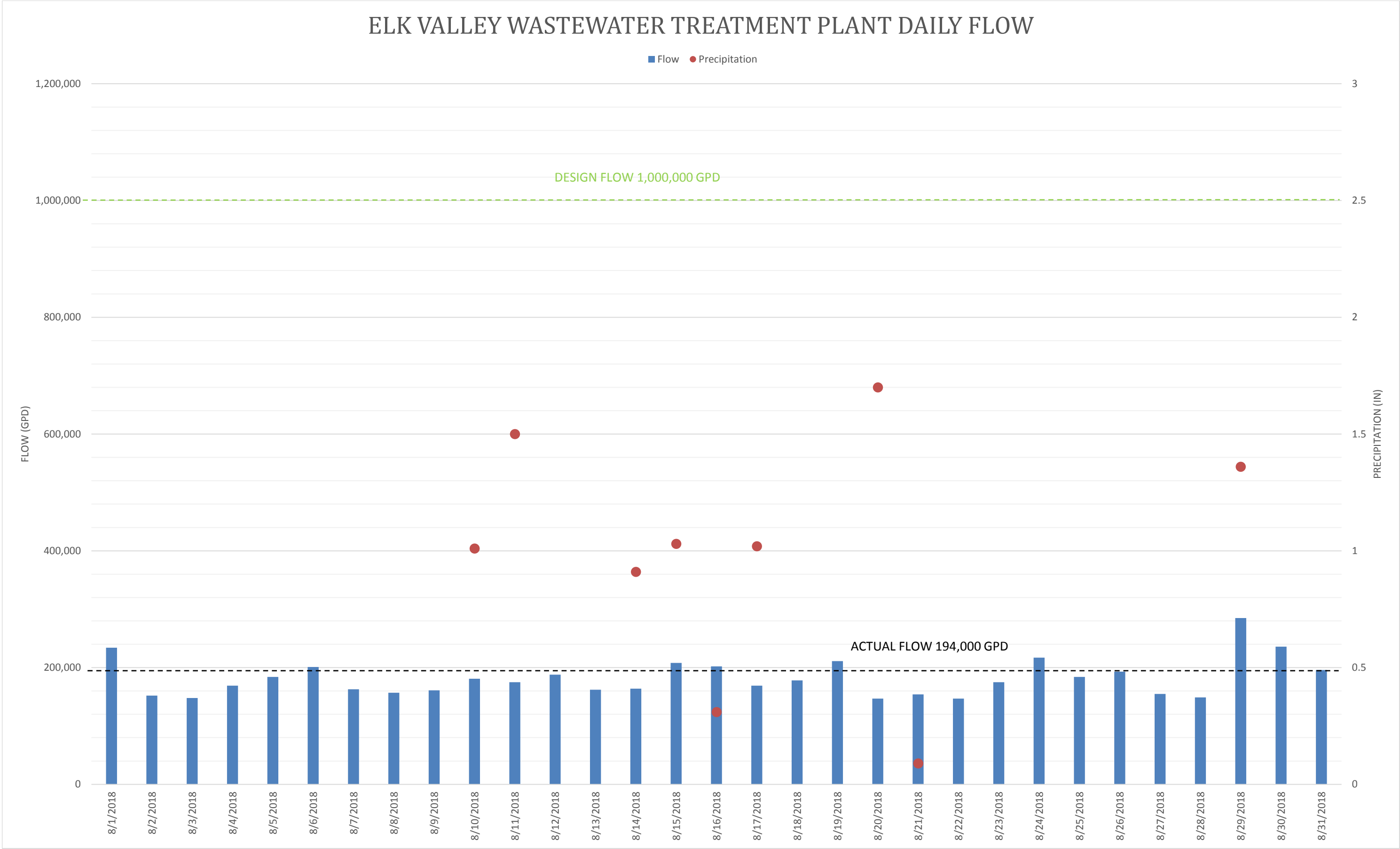


ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation

DESIGN FLOW 1,000,000 GPD

ACTUAL FLOW 194,000 GPD



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

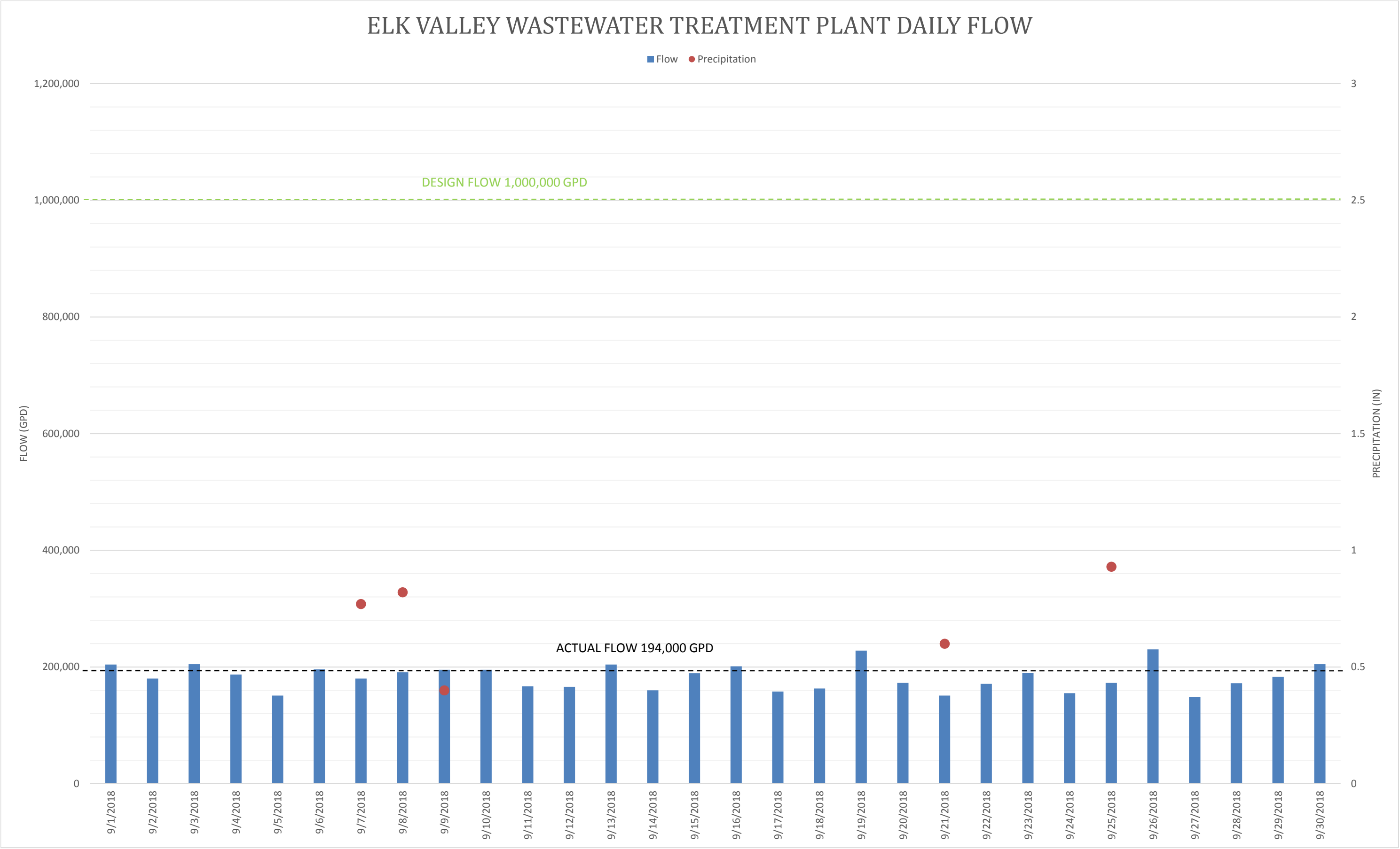
Flow Precipitation

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ACTUAL FLOW 194,000 GPD

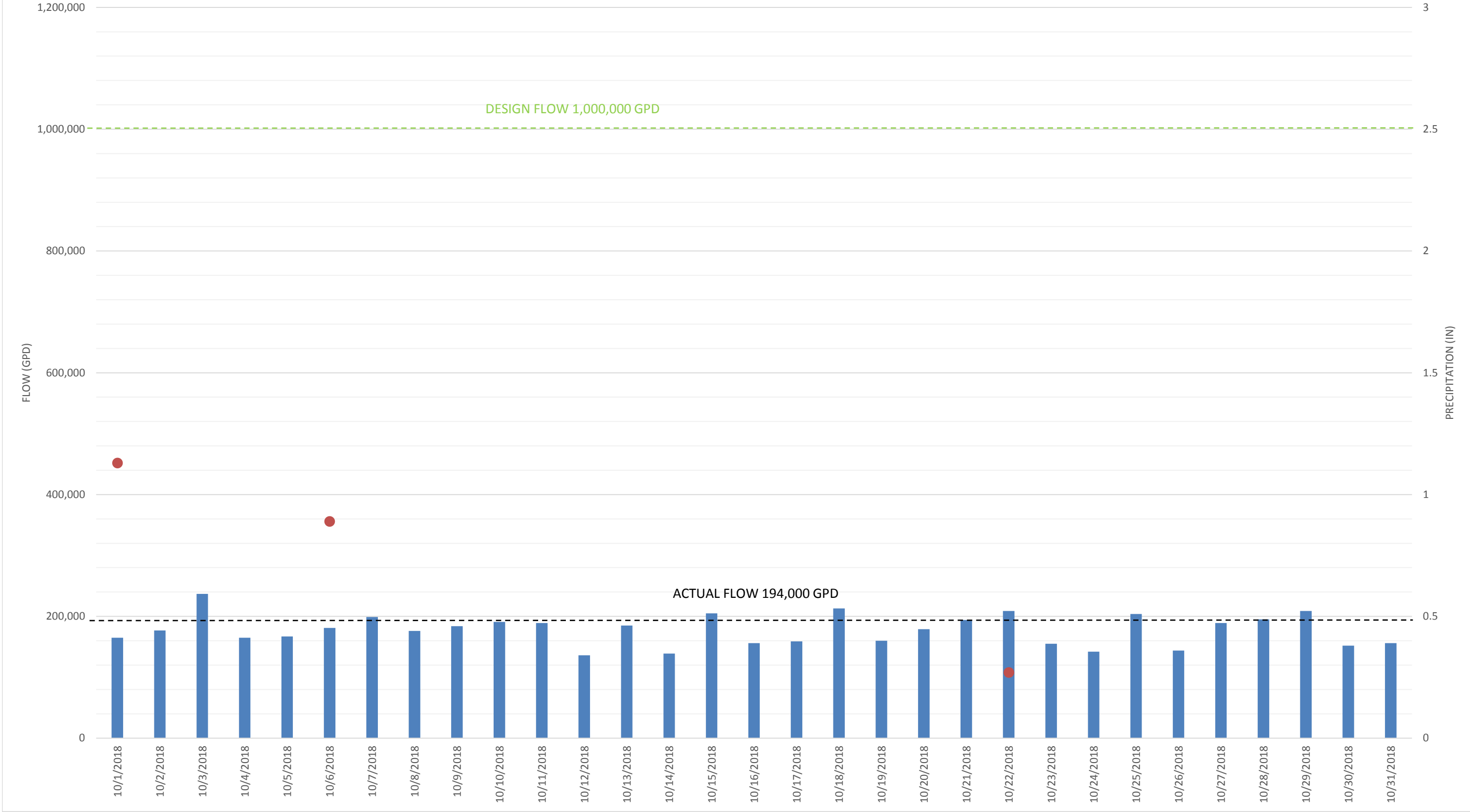
FLOW (GPD)

PRECIPITATION (IN)



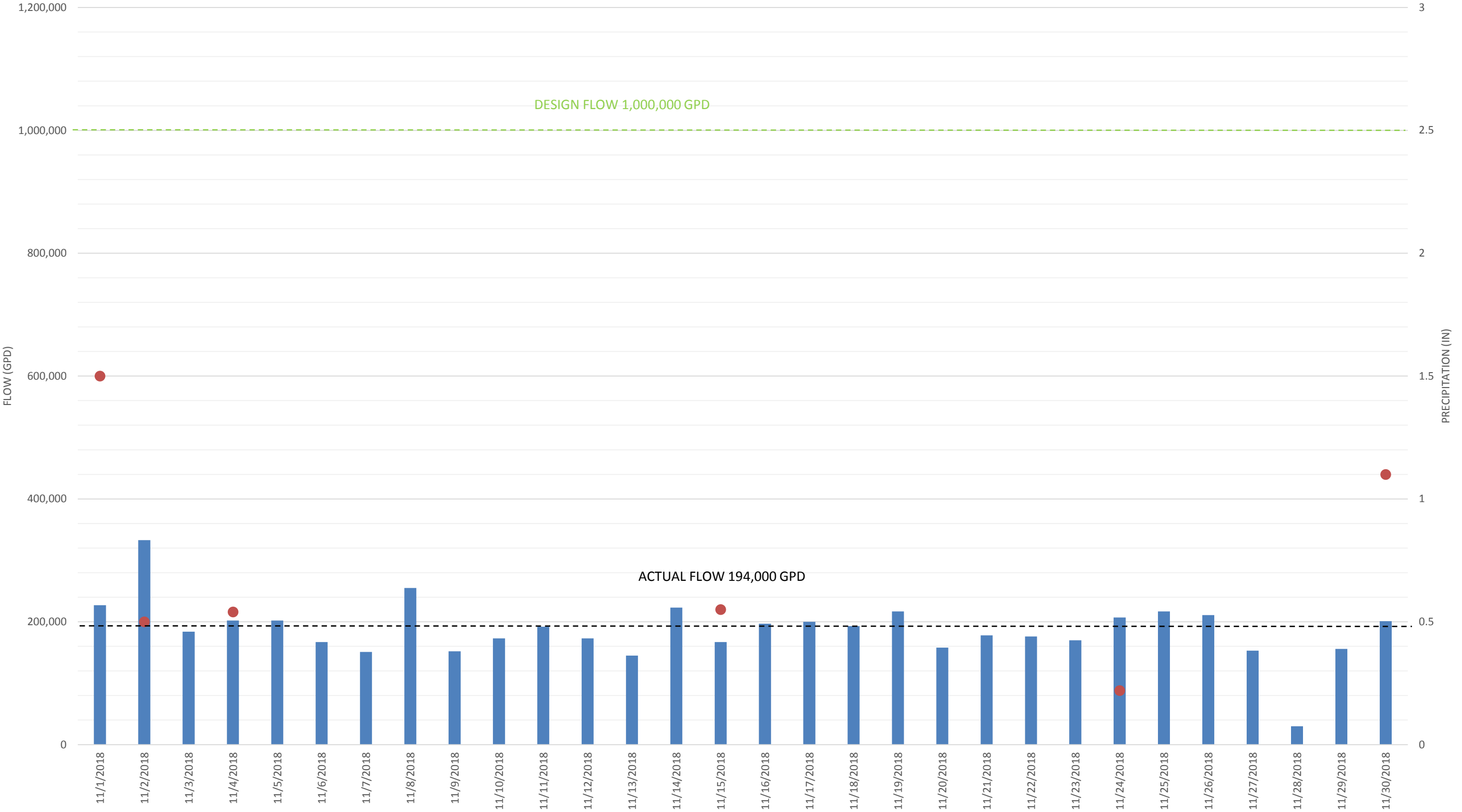
ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

Flow Precipitation



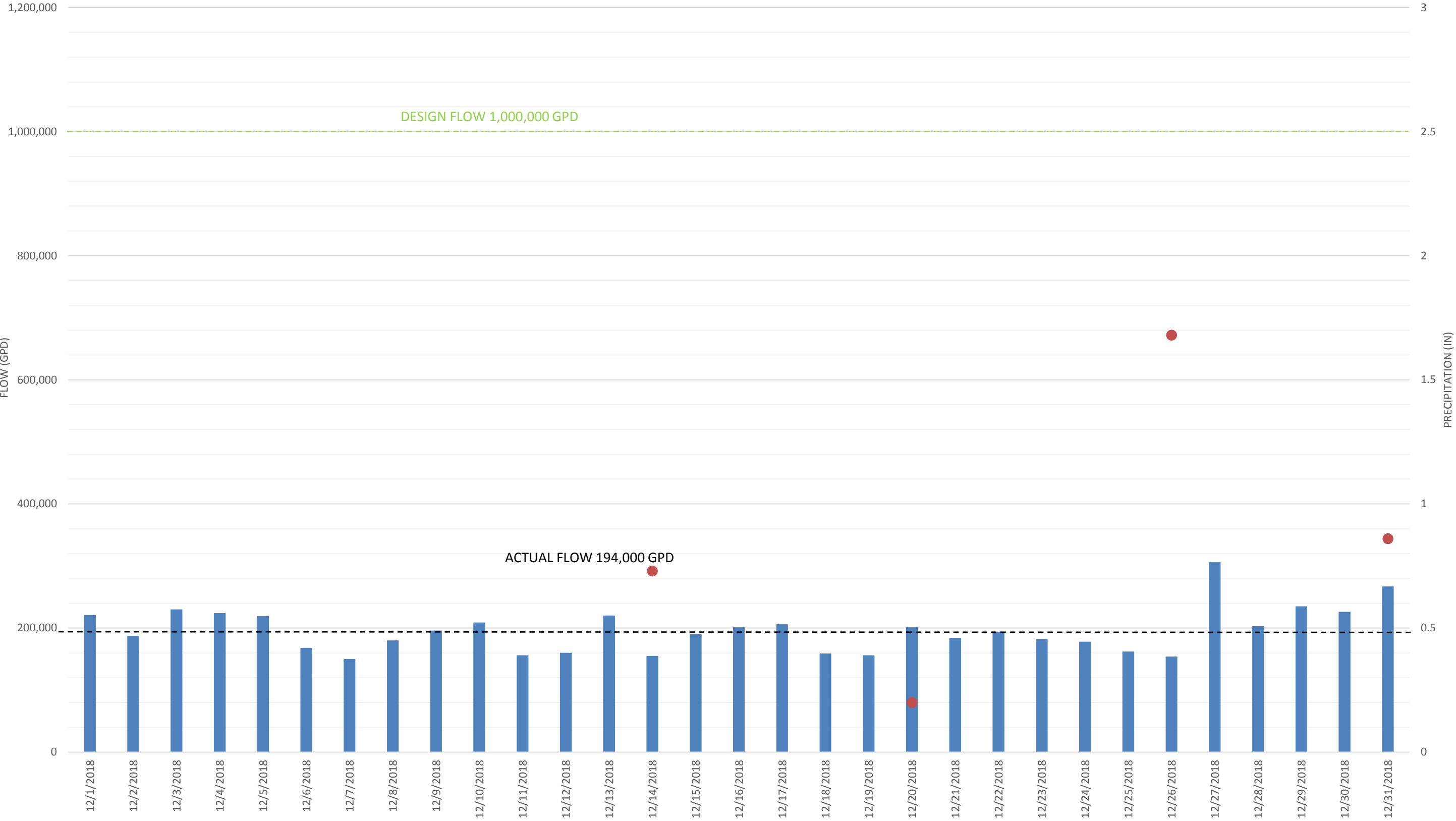
ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation



ELK VALLEY WASTEWATER TREATMENT PLANT DAILY FLOW

■ Flow ● Precipitation

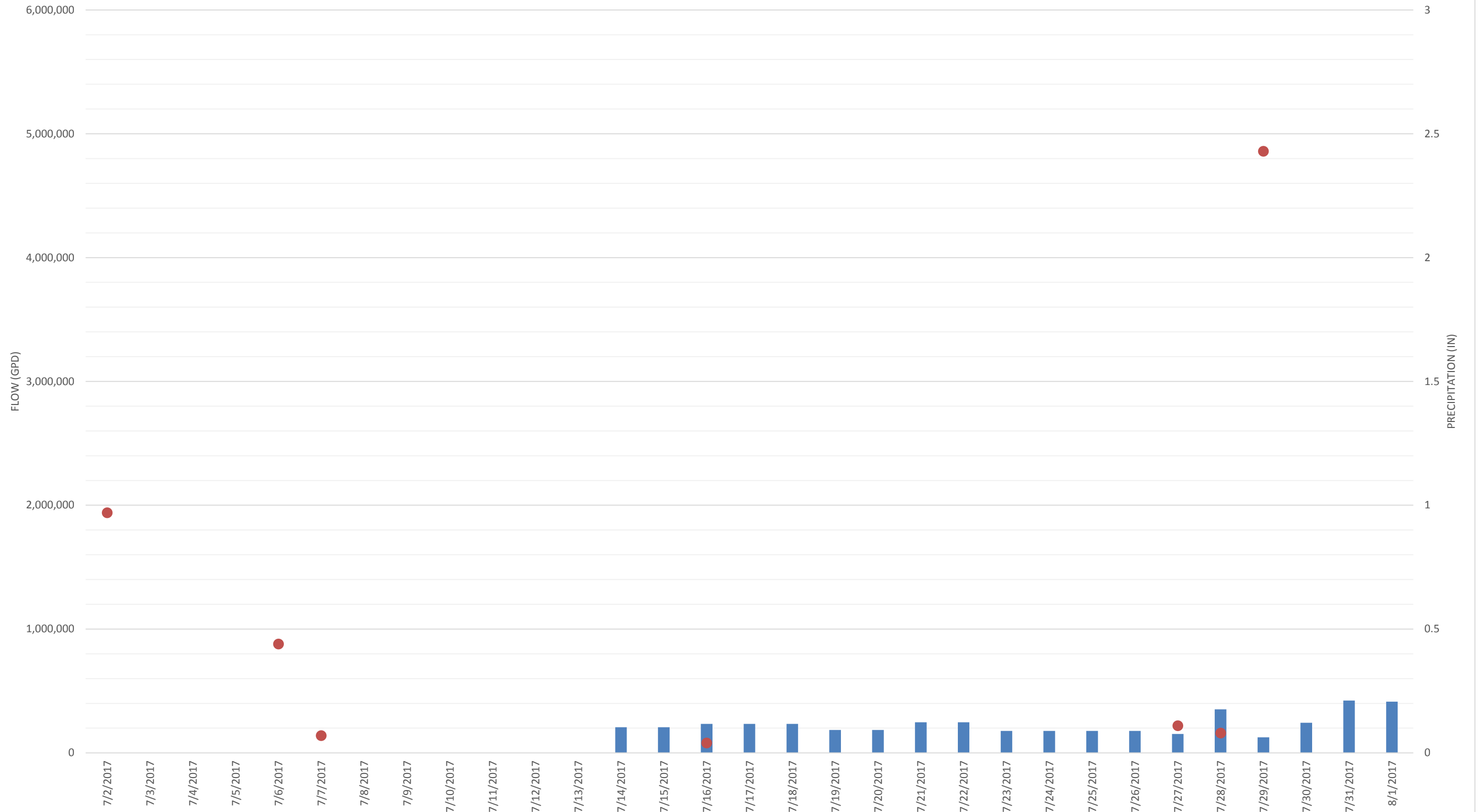


APPENDIX I
LAMBERTS LIFT STATION FLOW DATA

DRAFT

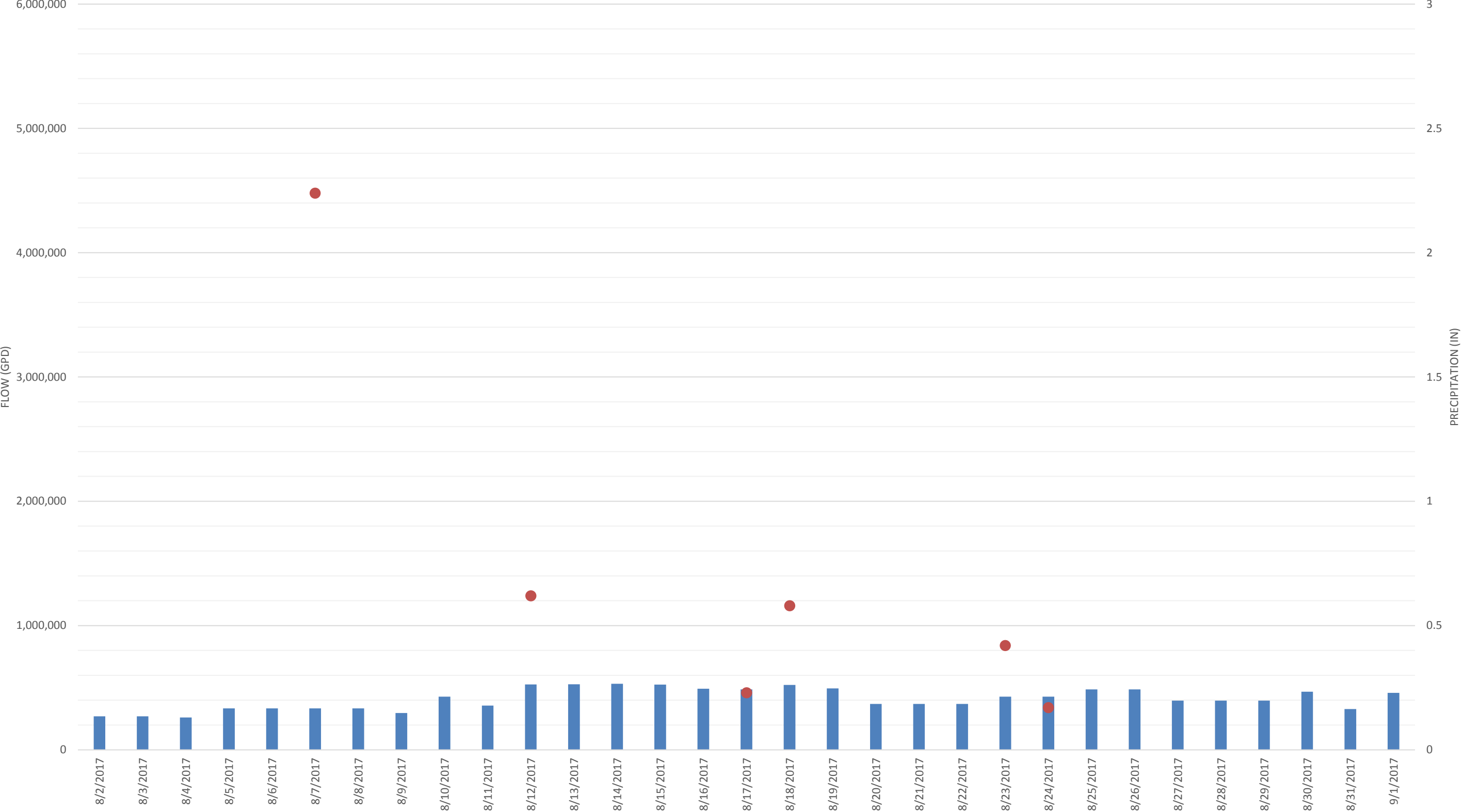
LAMBERTS LIFT STATION DAILY FLOW

■ Flow ● Precipitation



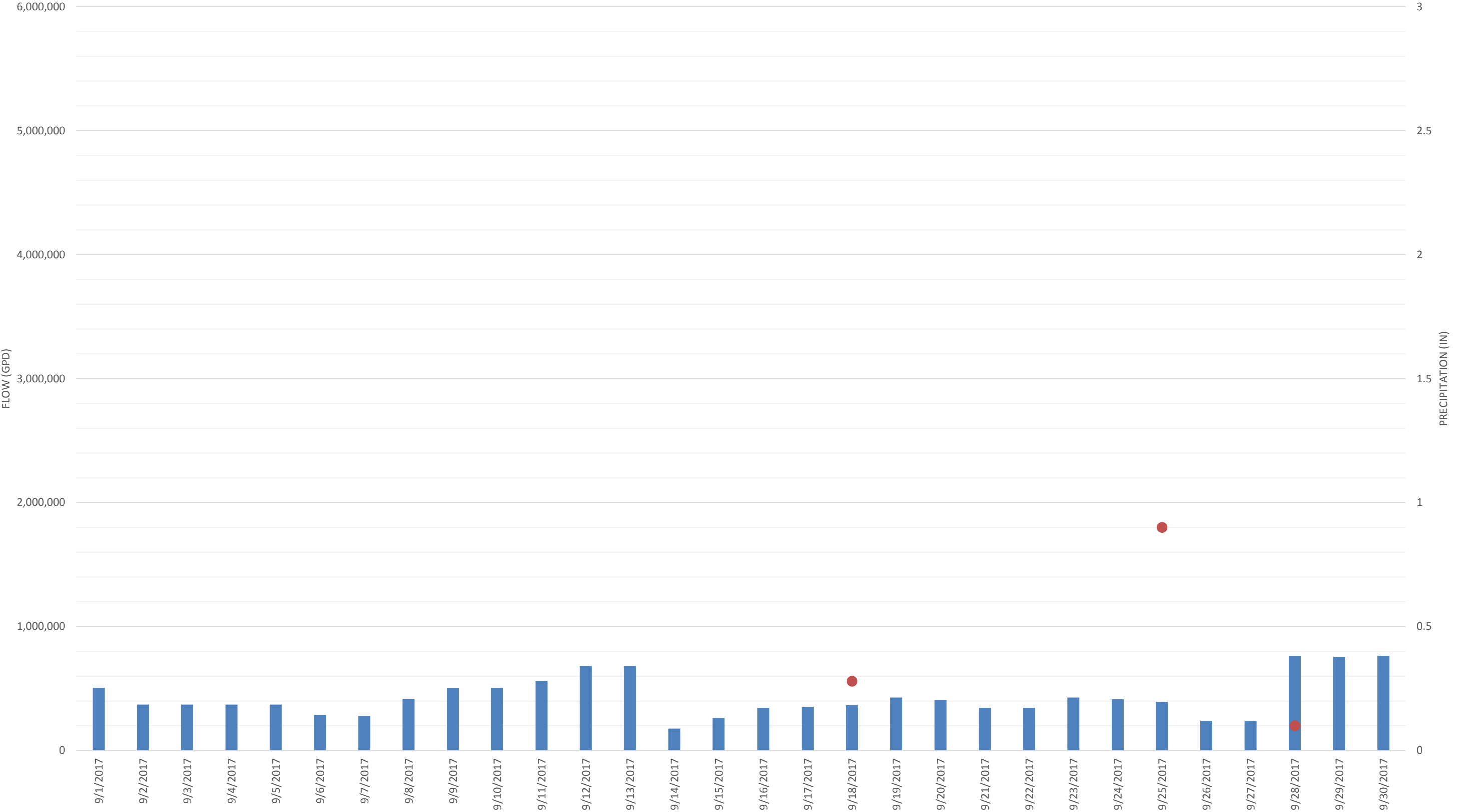
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



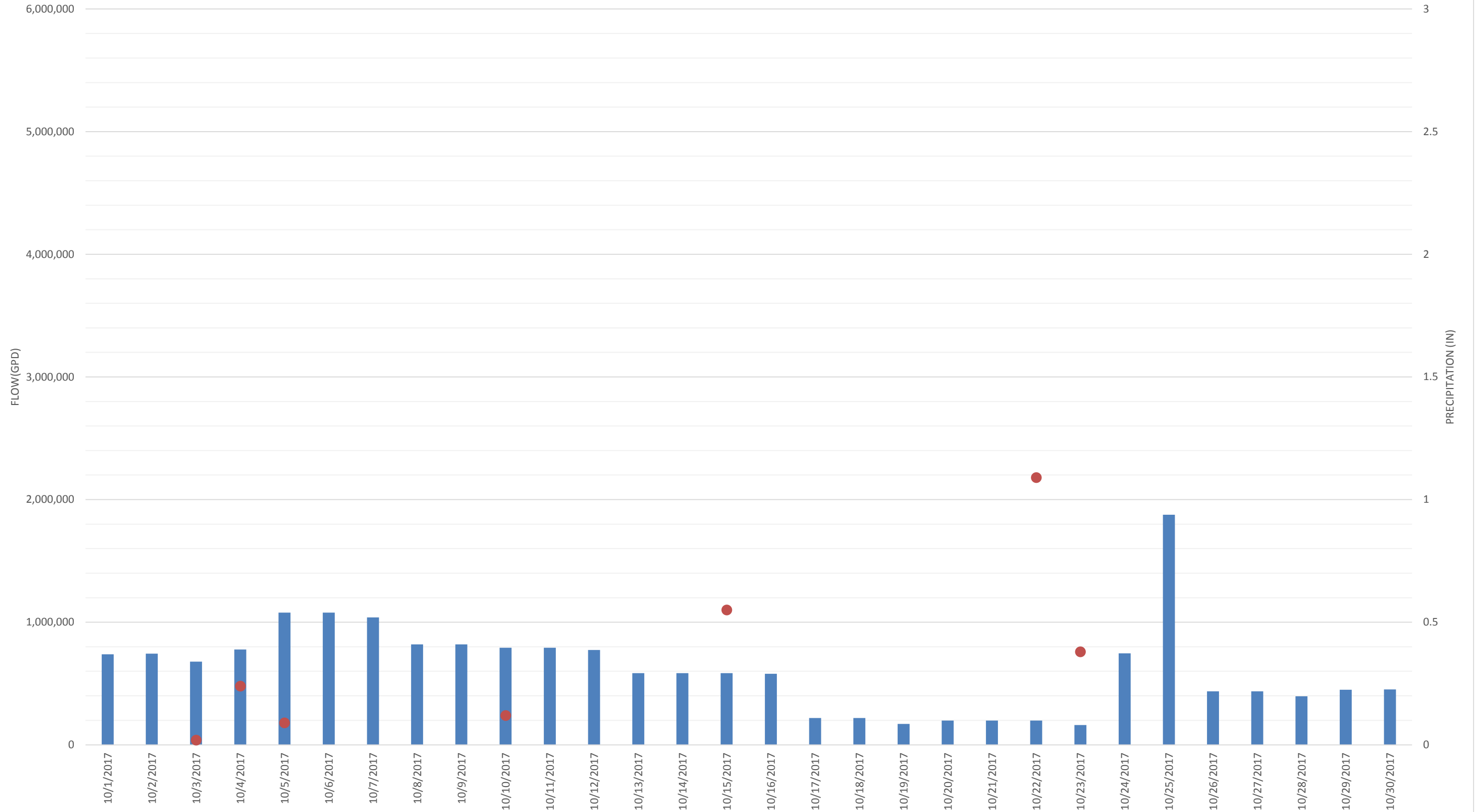
LAMBERTS LIFT STATION DAILY FLOW

■ Flow ● Precipitation



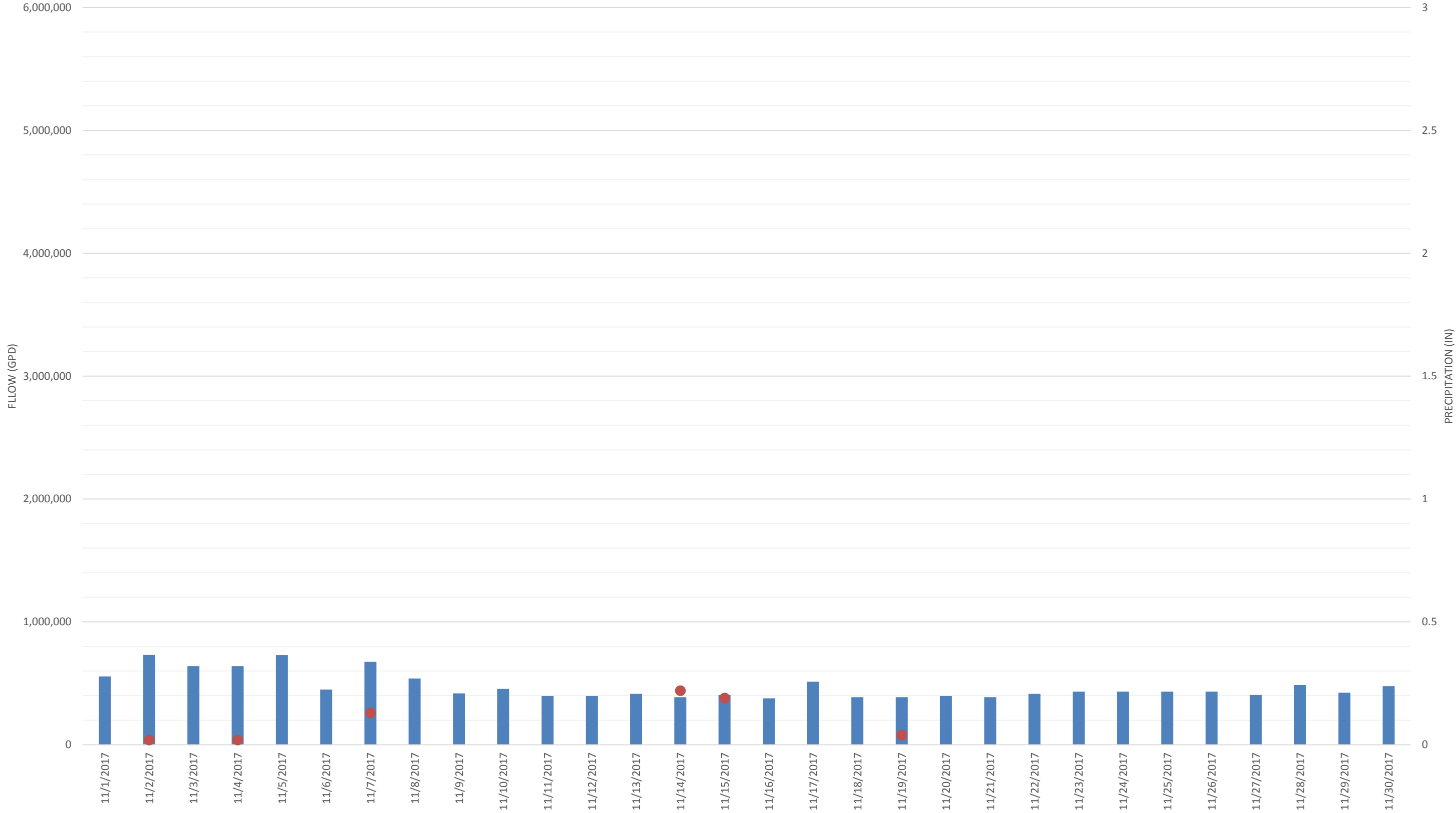
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



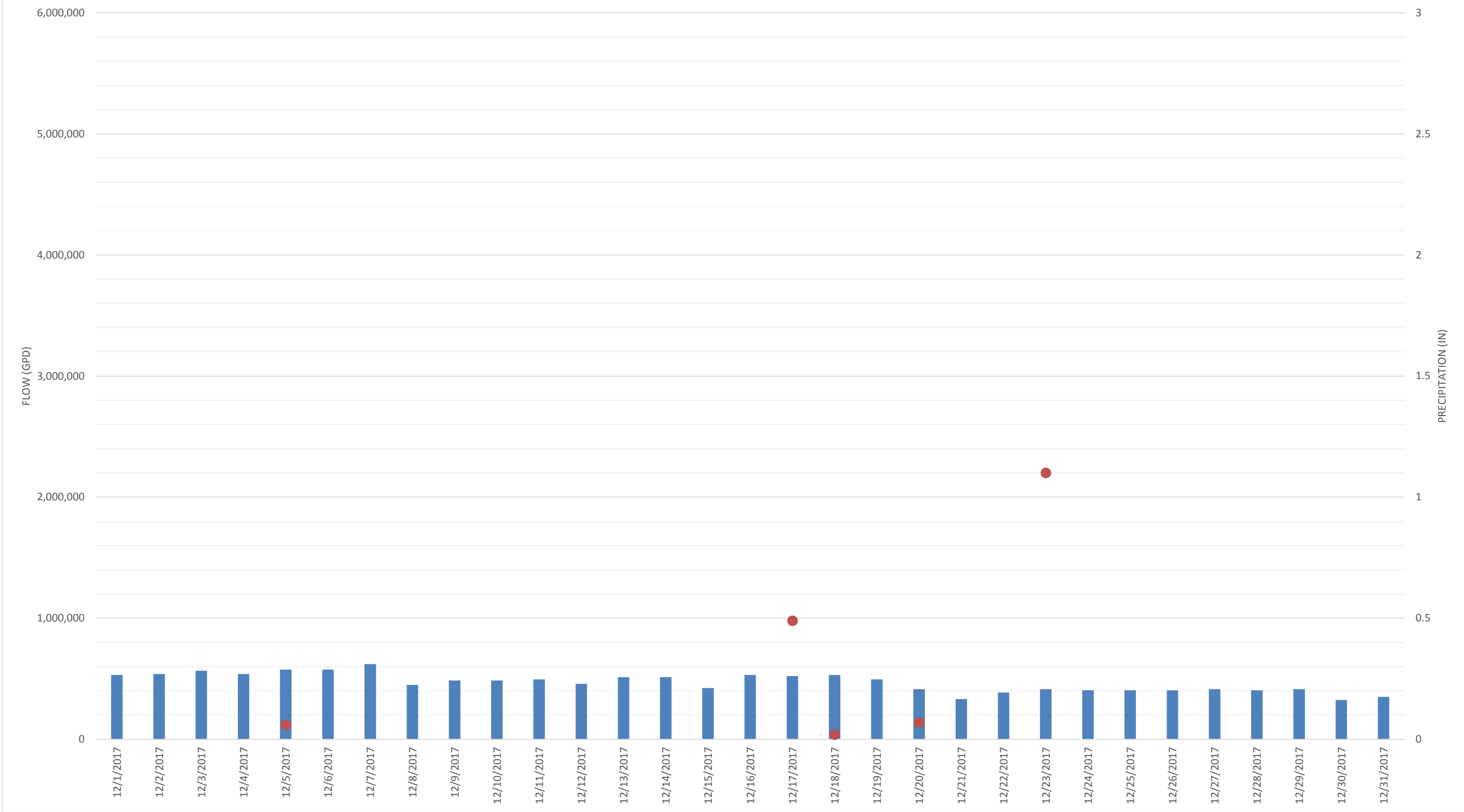
LAMBERTS LIFT STATION DAILY FLOW

■ Flow ● Precipitation



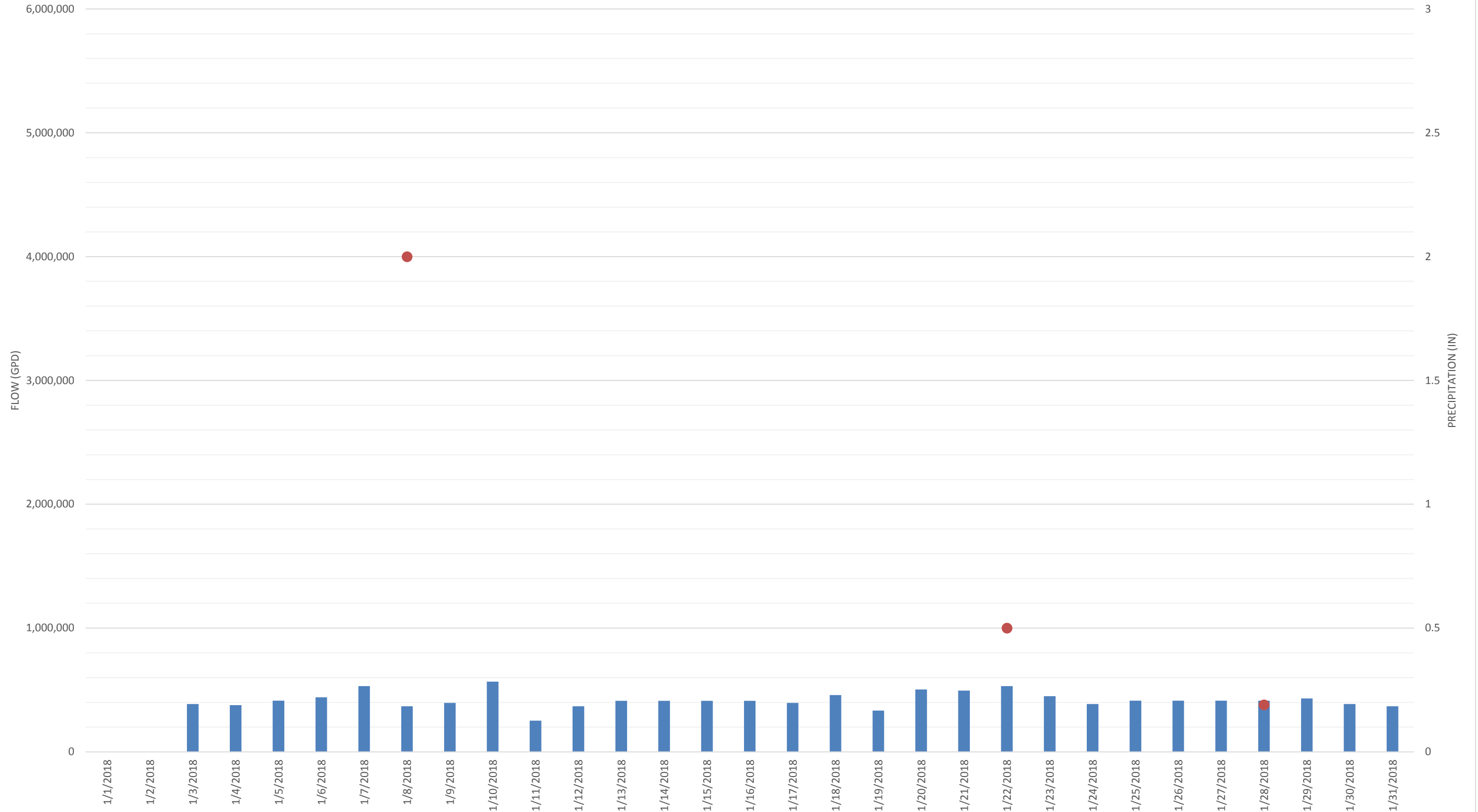
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



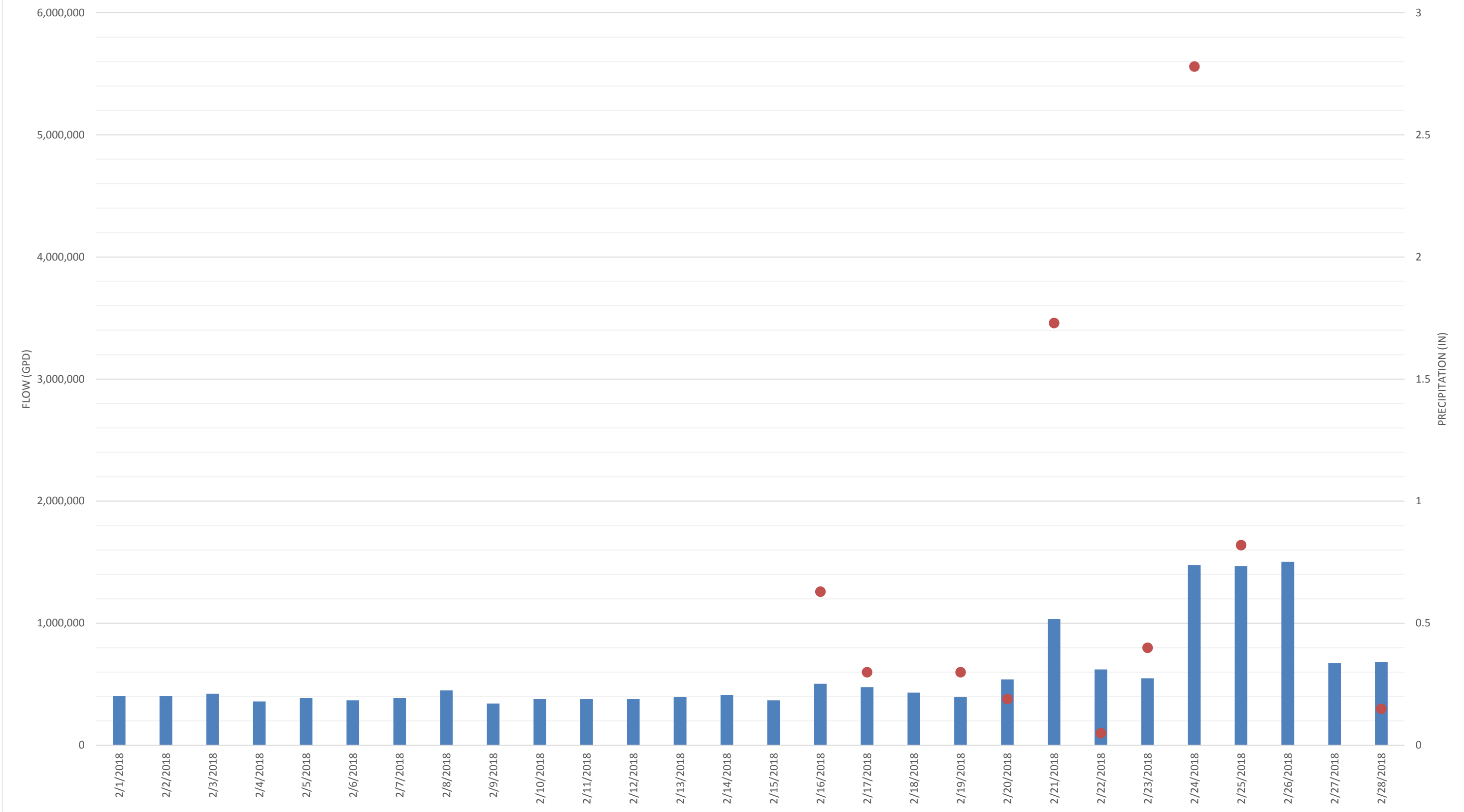
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



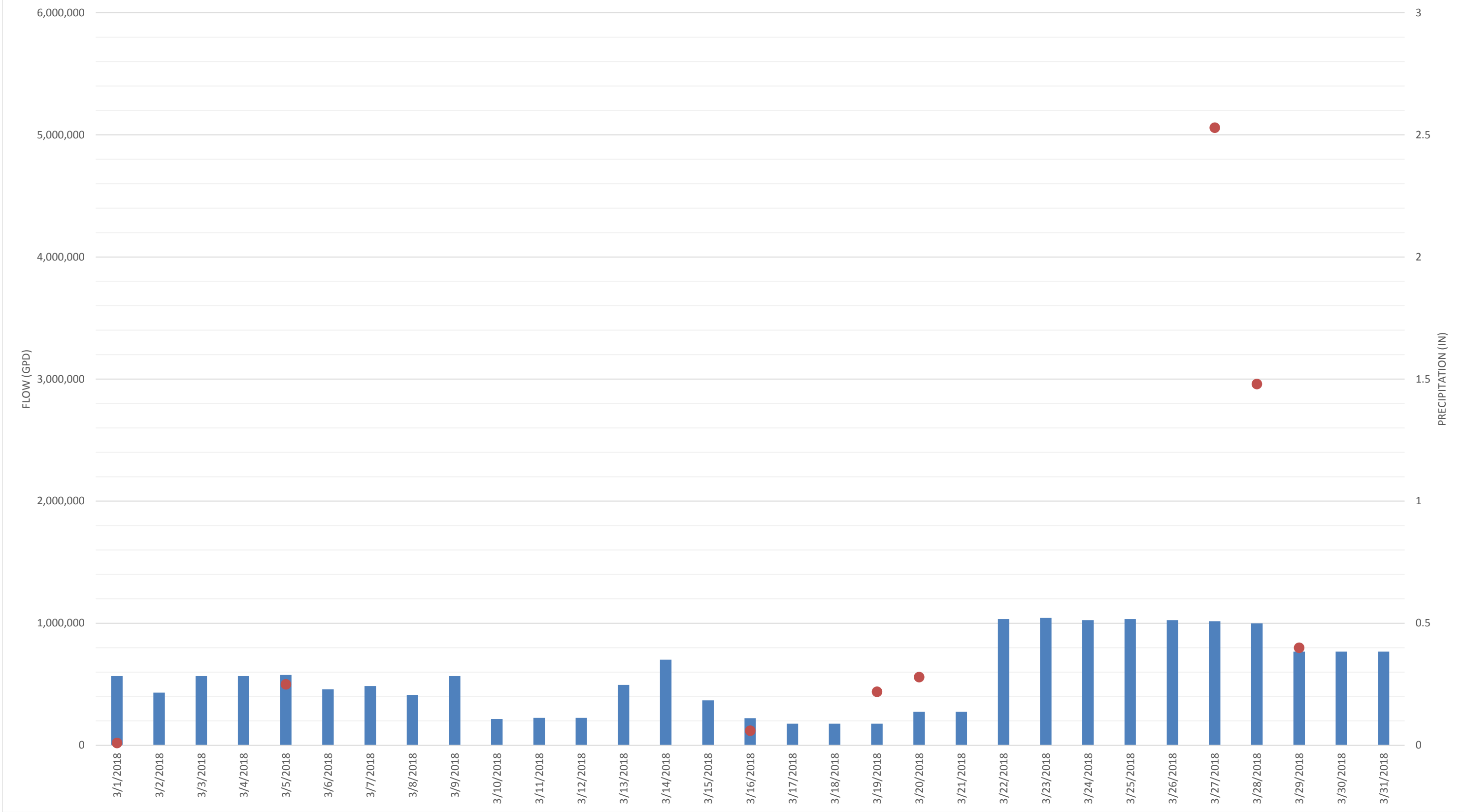
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



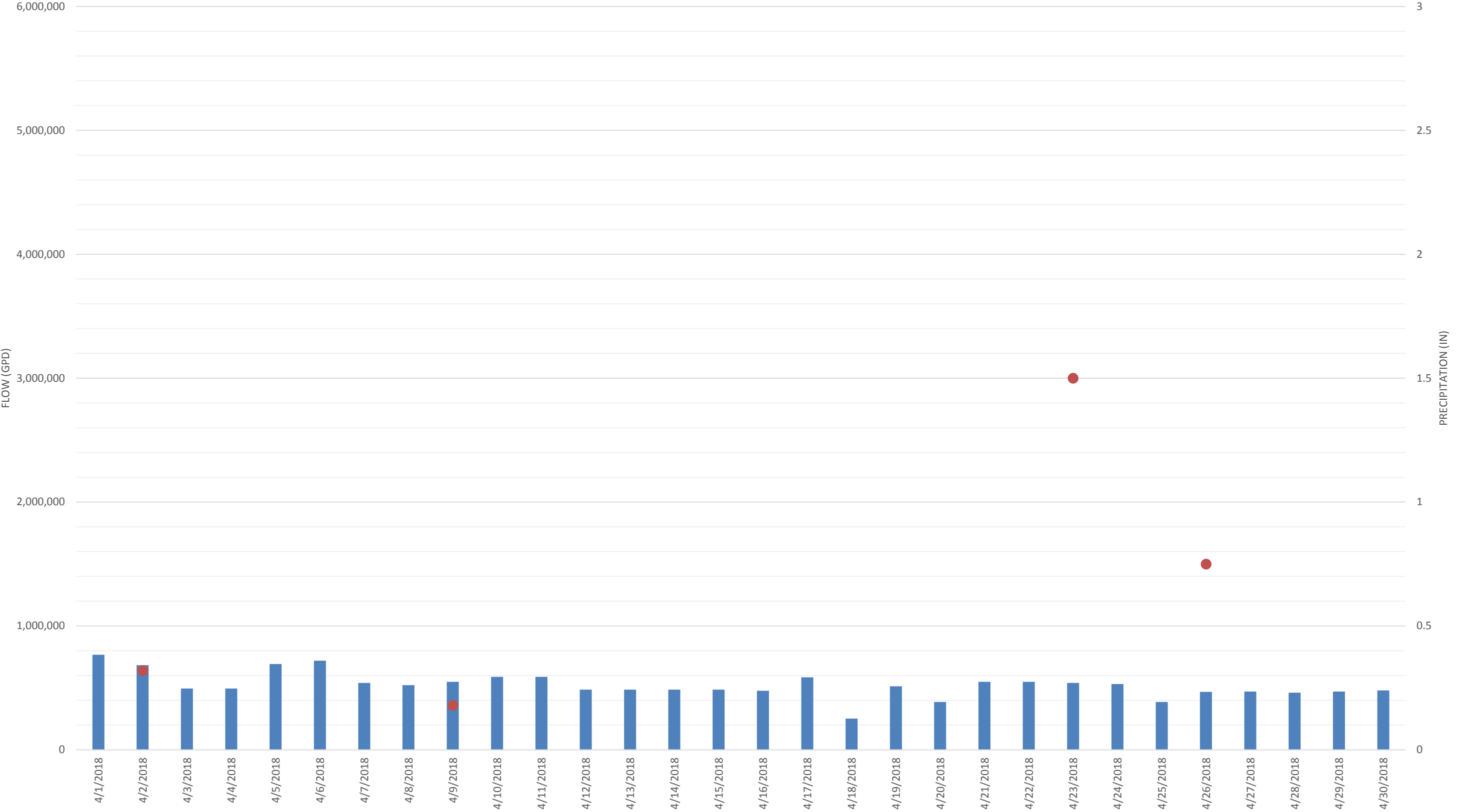
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



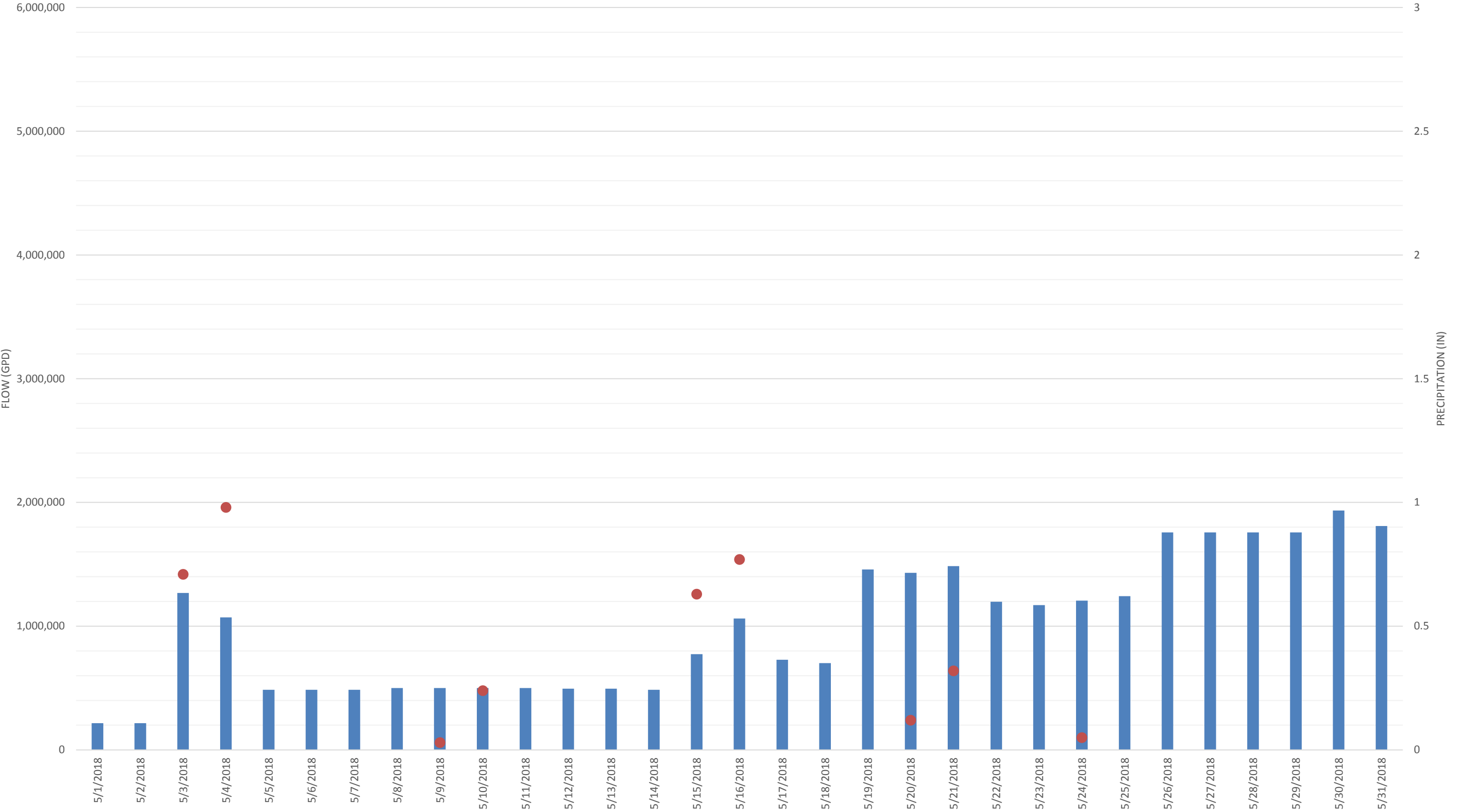
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



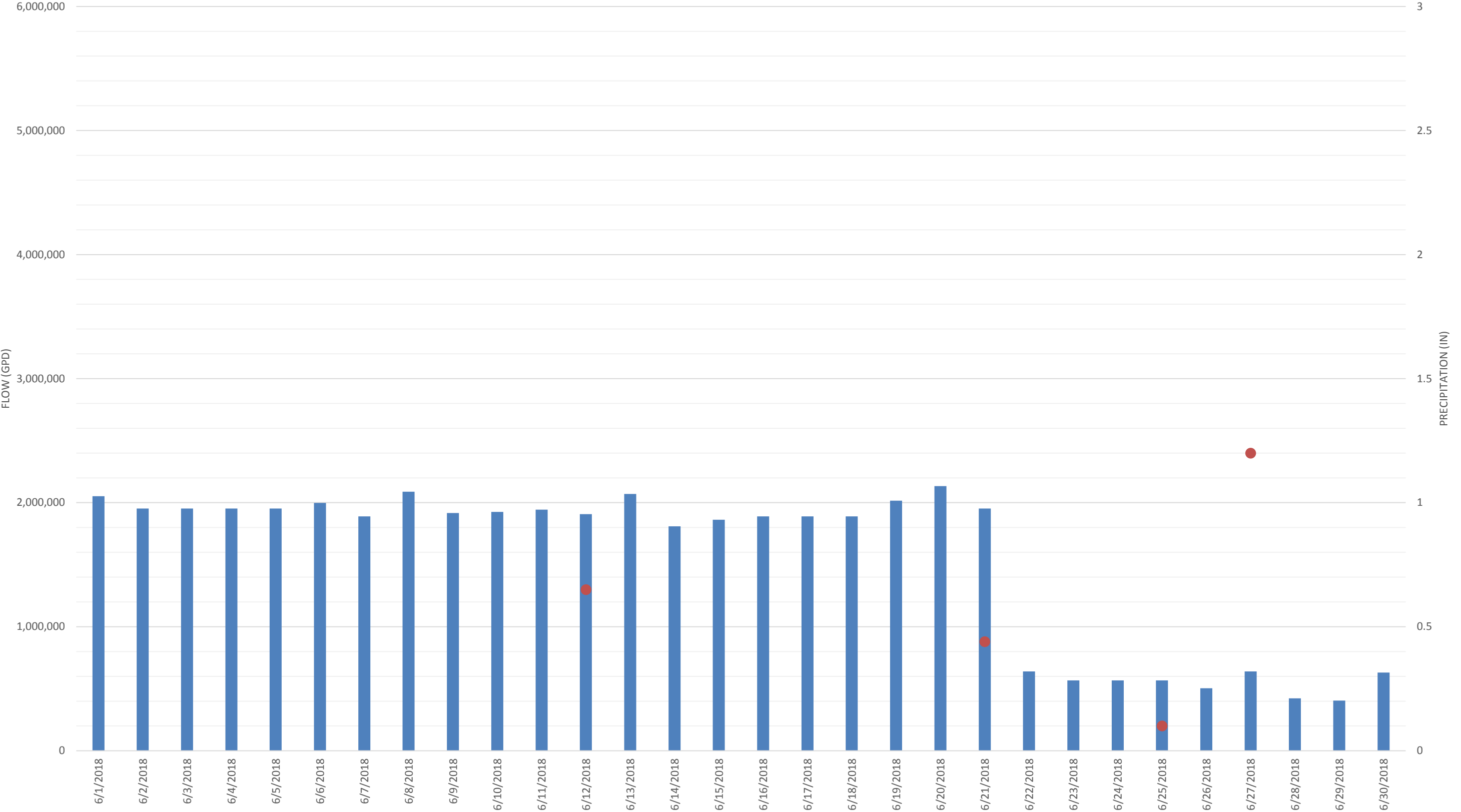
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



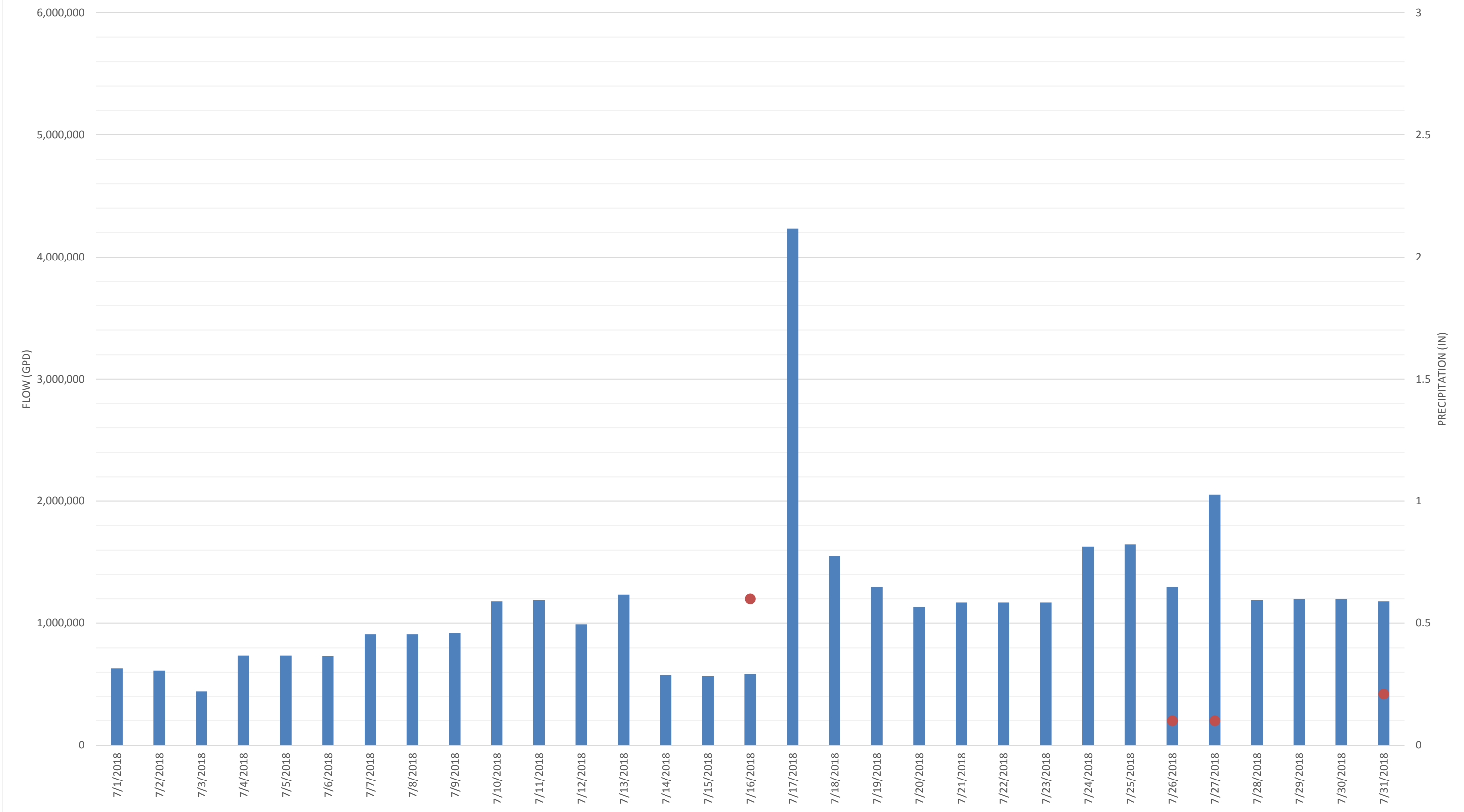
LAMBERTS LIFT STATION DAILY FLOW

■ Flow ● Precipitation



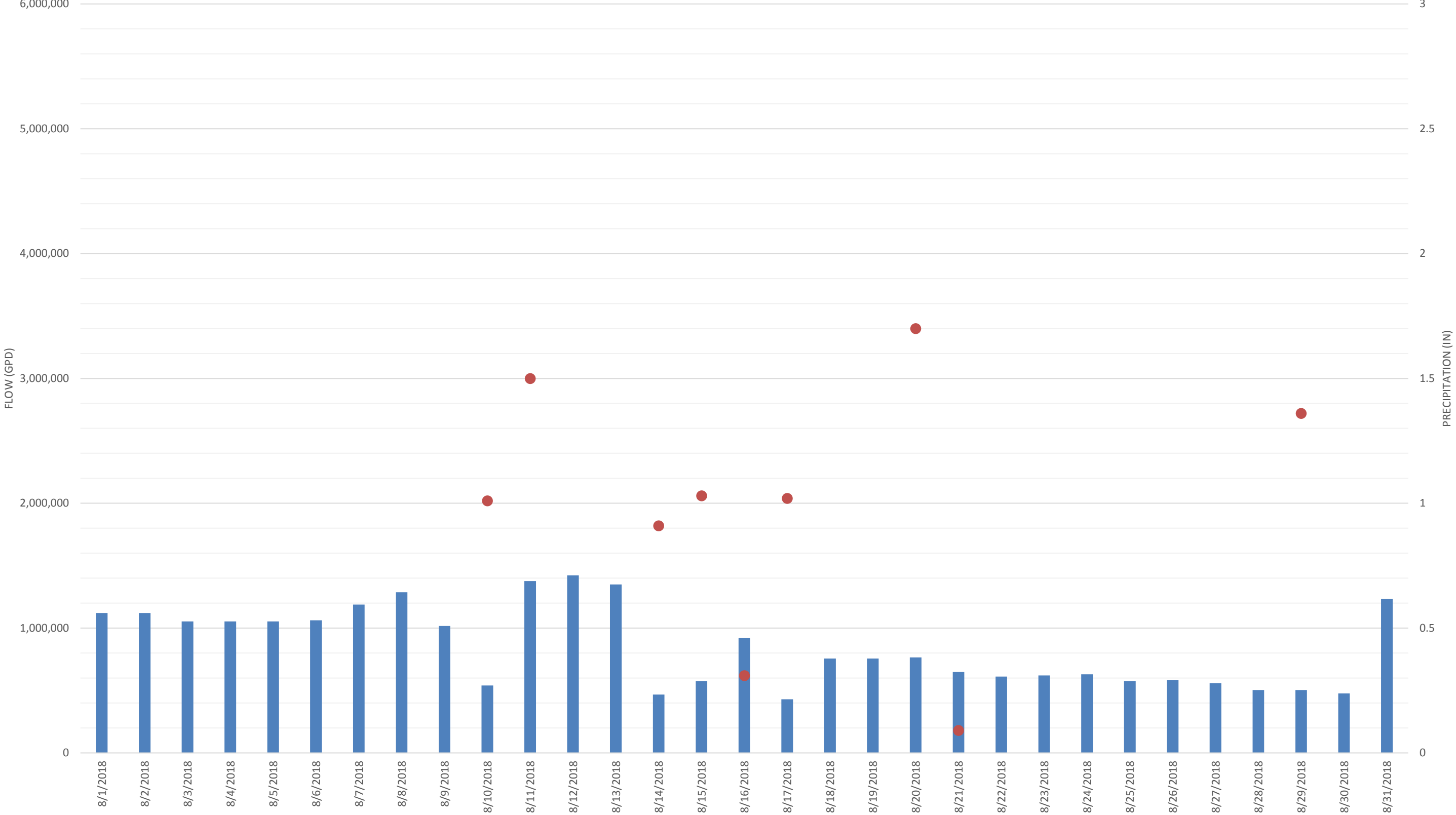
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation

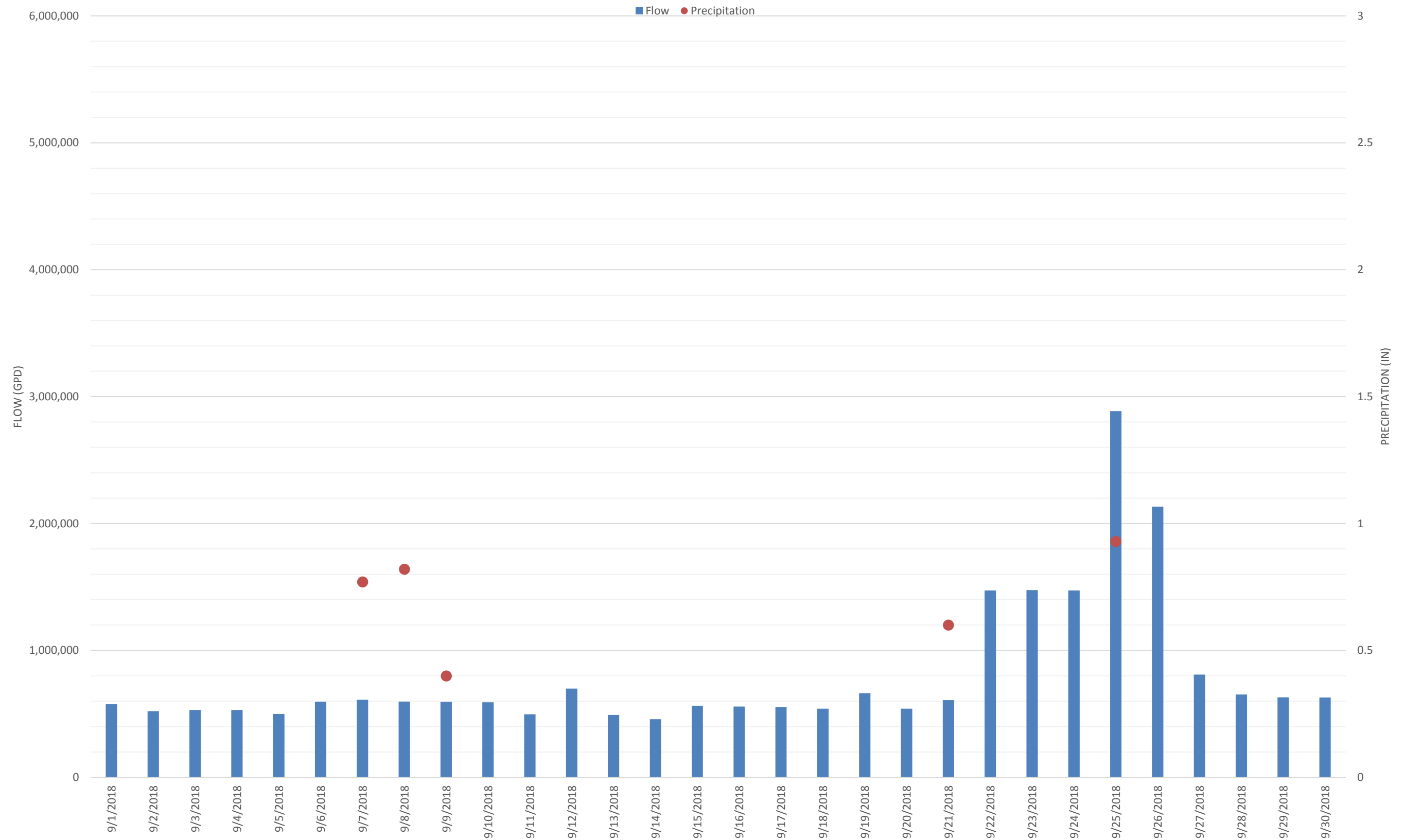


LAMBERTS LIFT STATION DAILY FLOW

■ Flow ● Precipitation

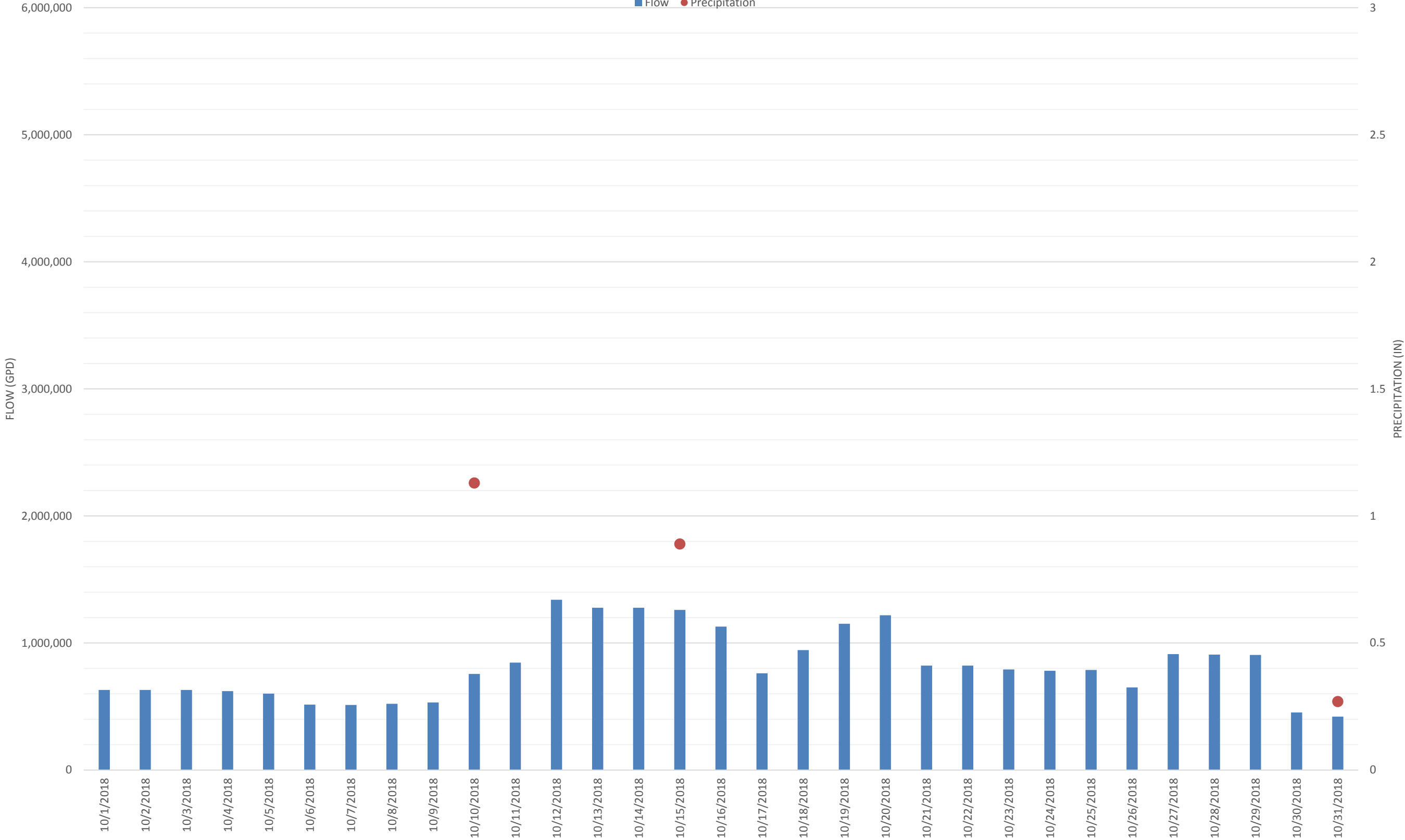


LAMBERTS LIFT STATION DAILY FLOW



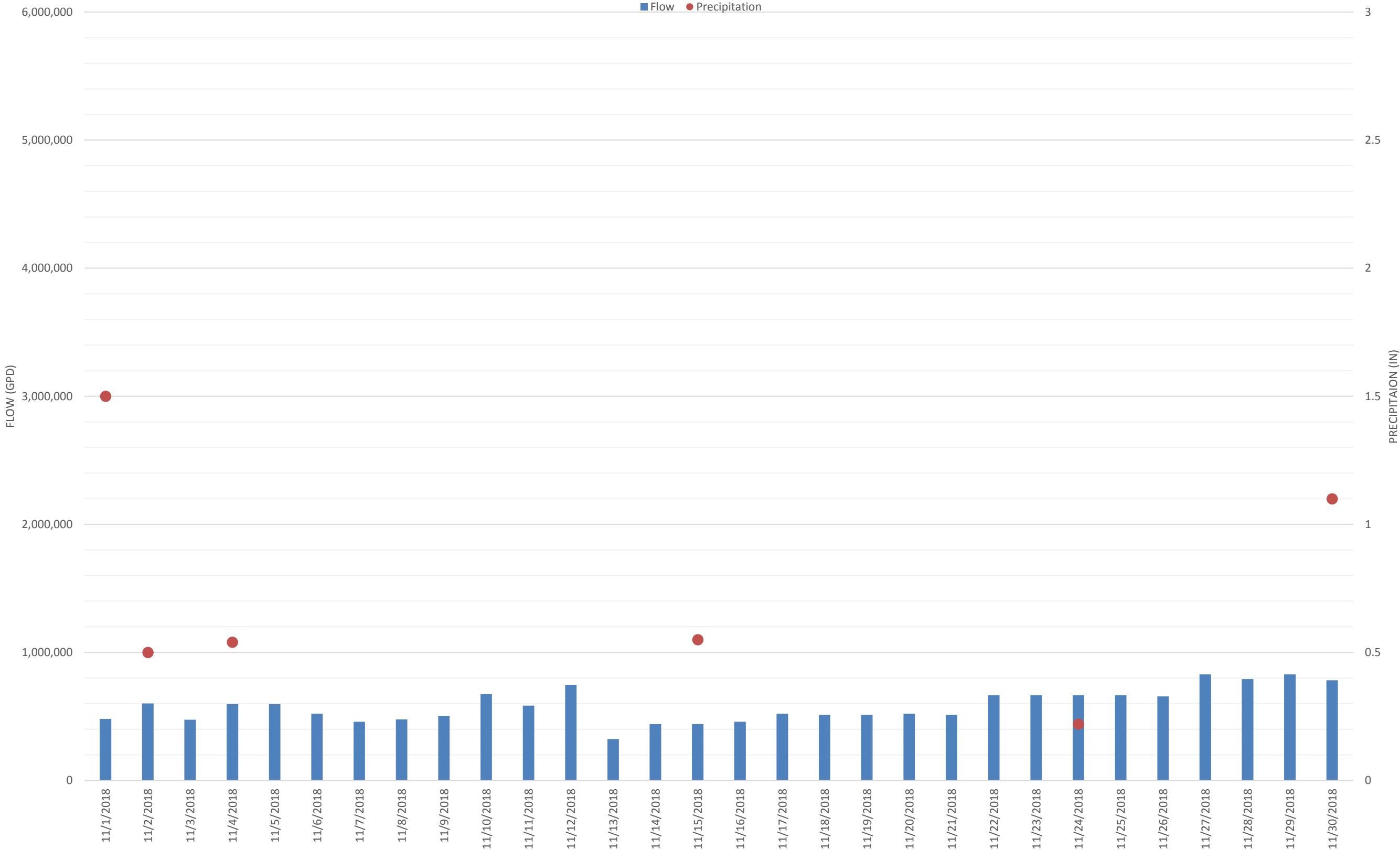
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



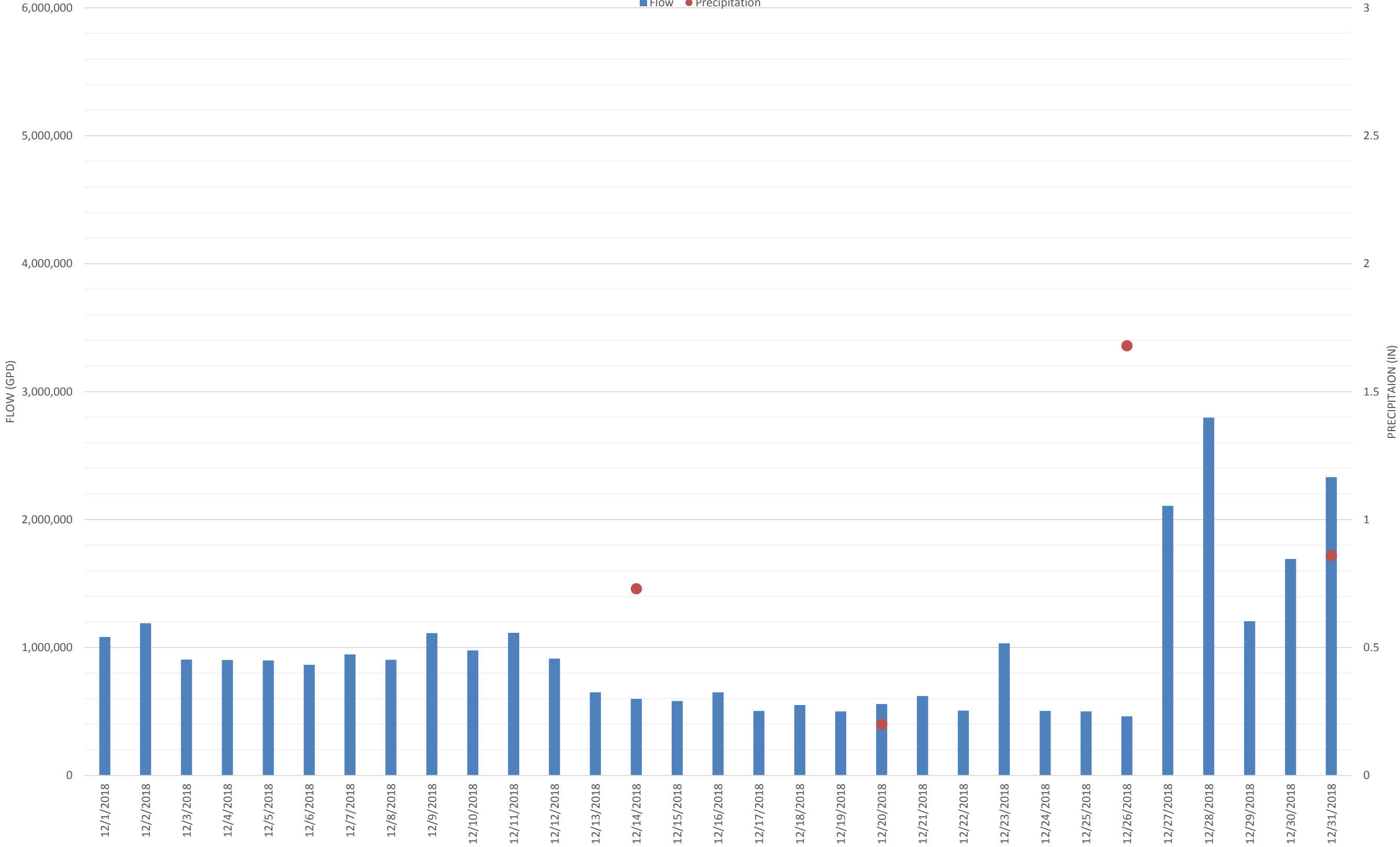
LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation



LAMBERTS LIFT STATION DAILY FLOW

Flow Precipitation

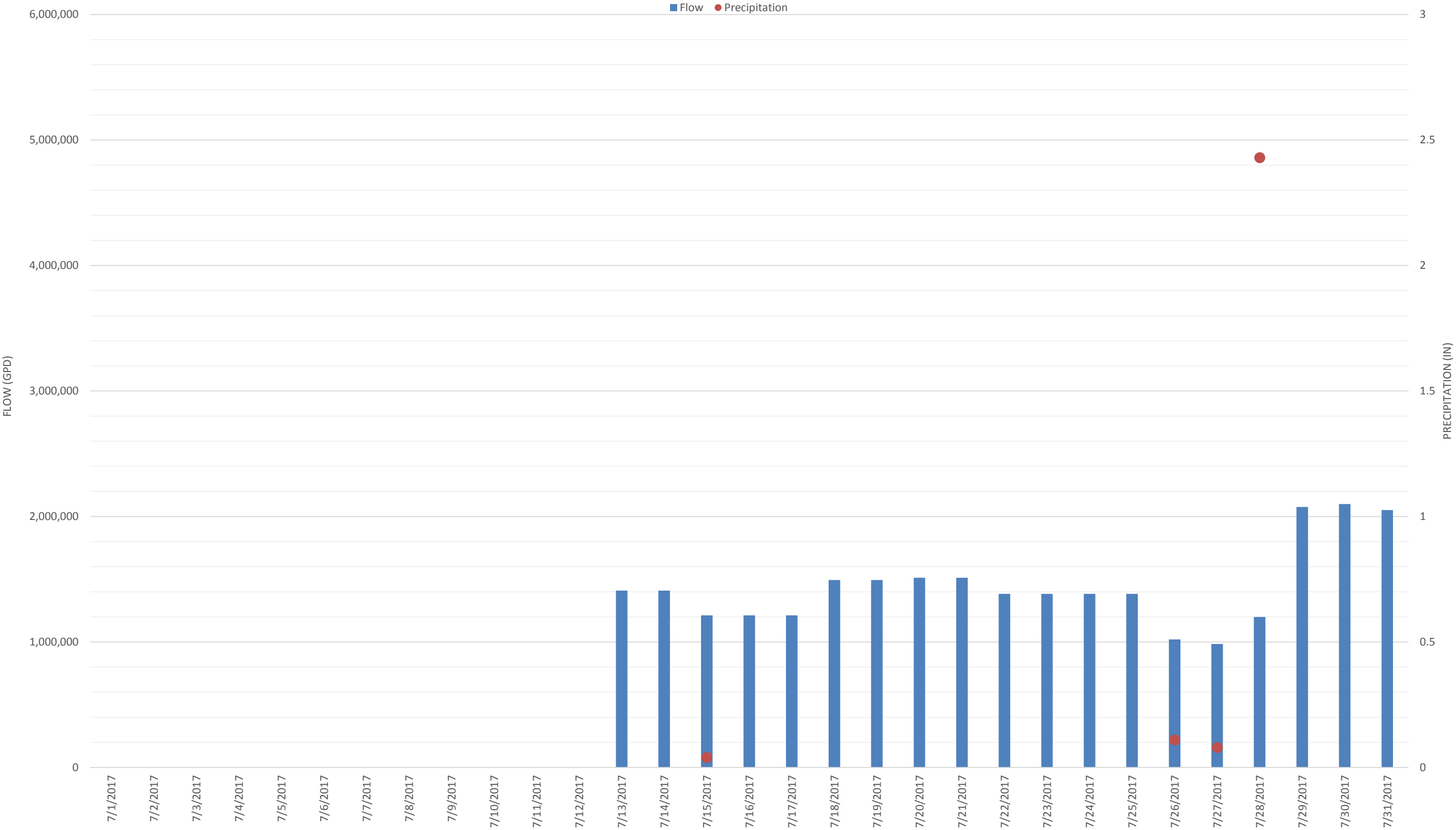


APPENDIX J
FASCO LIFT STATION FLOW DATA

DRAFT

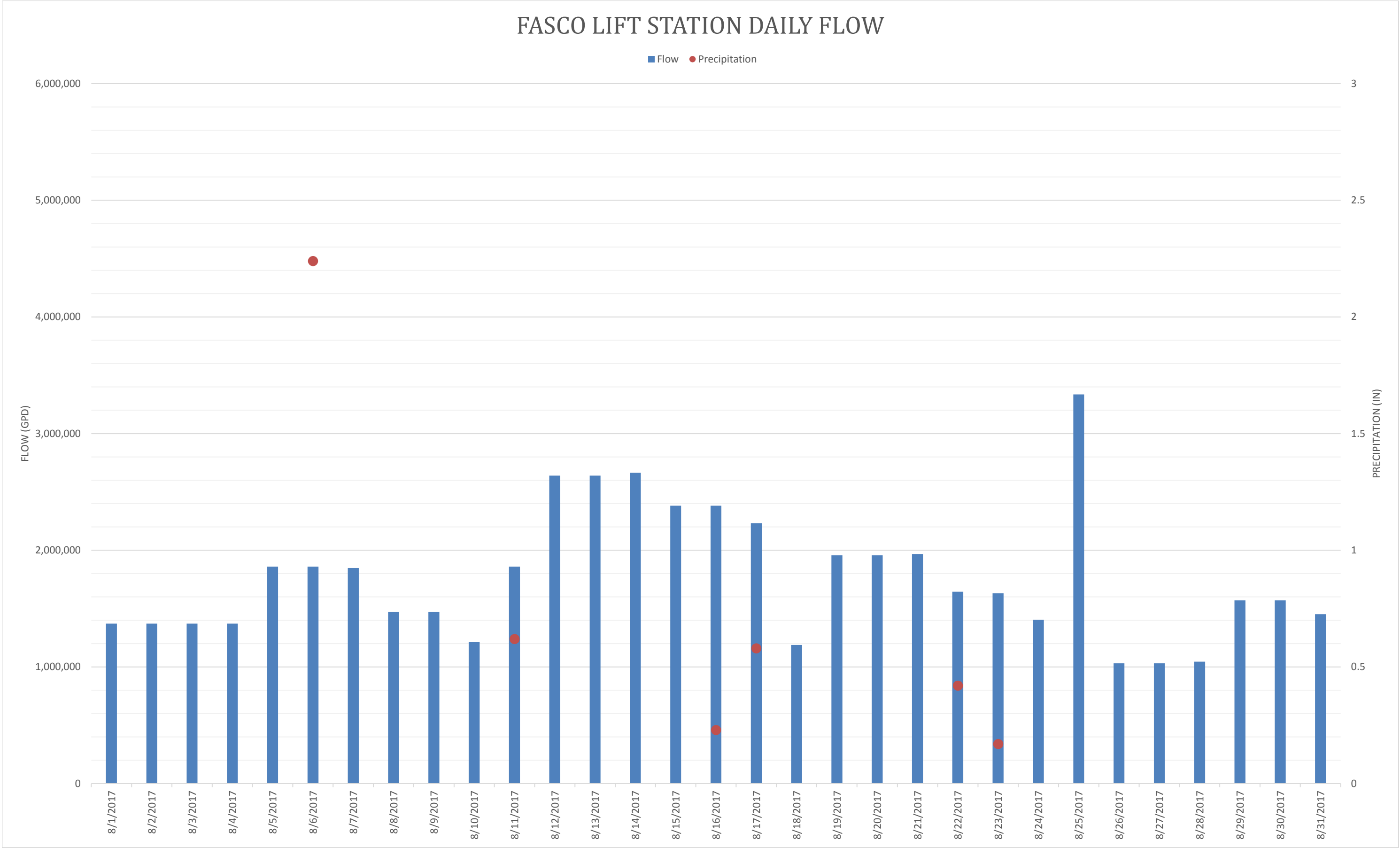
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



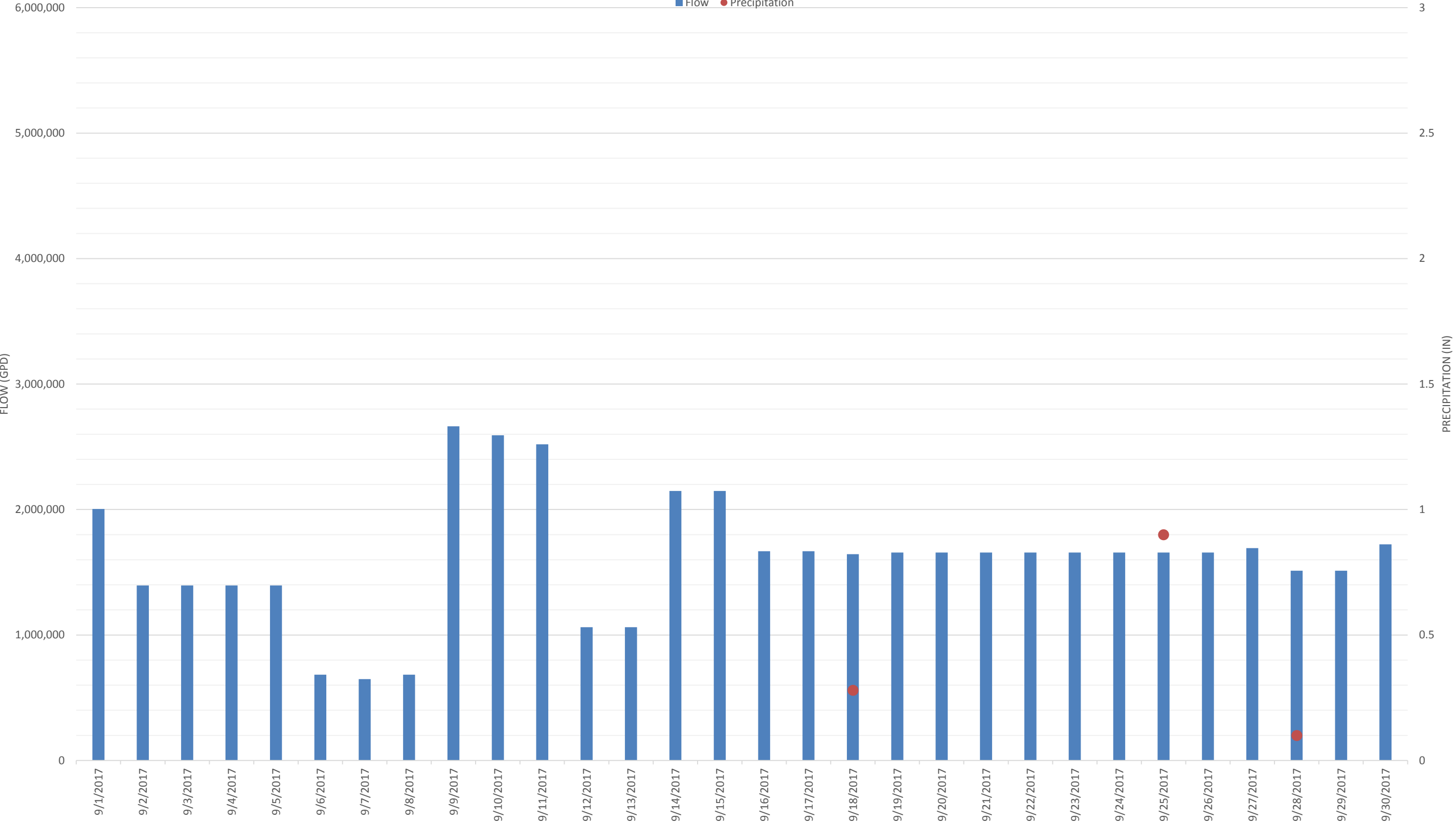
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



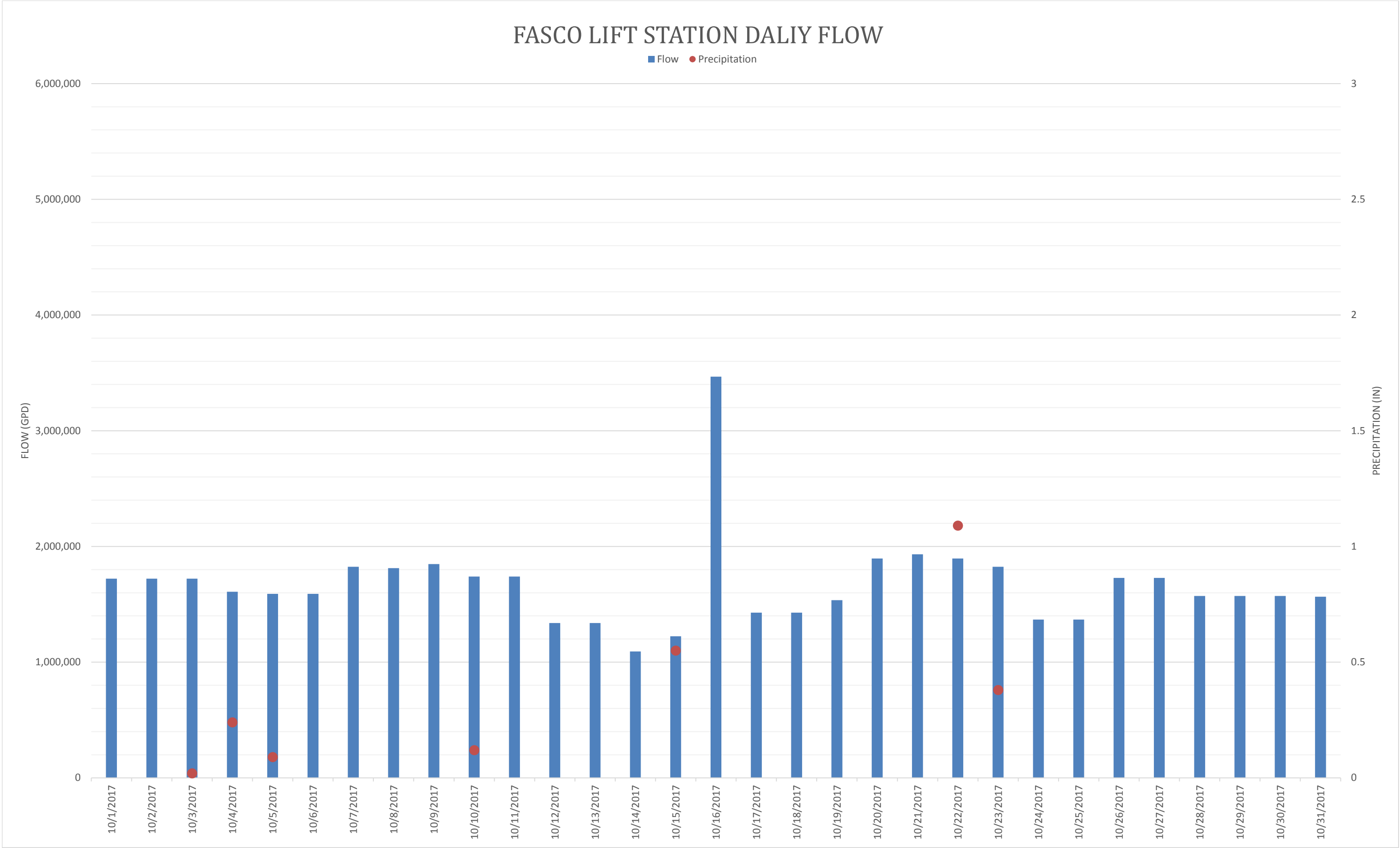
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



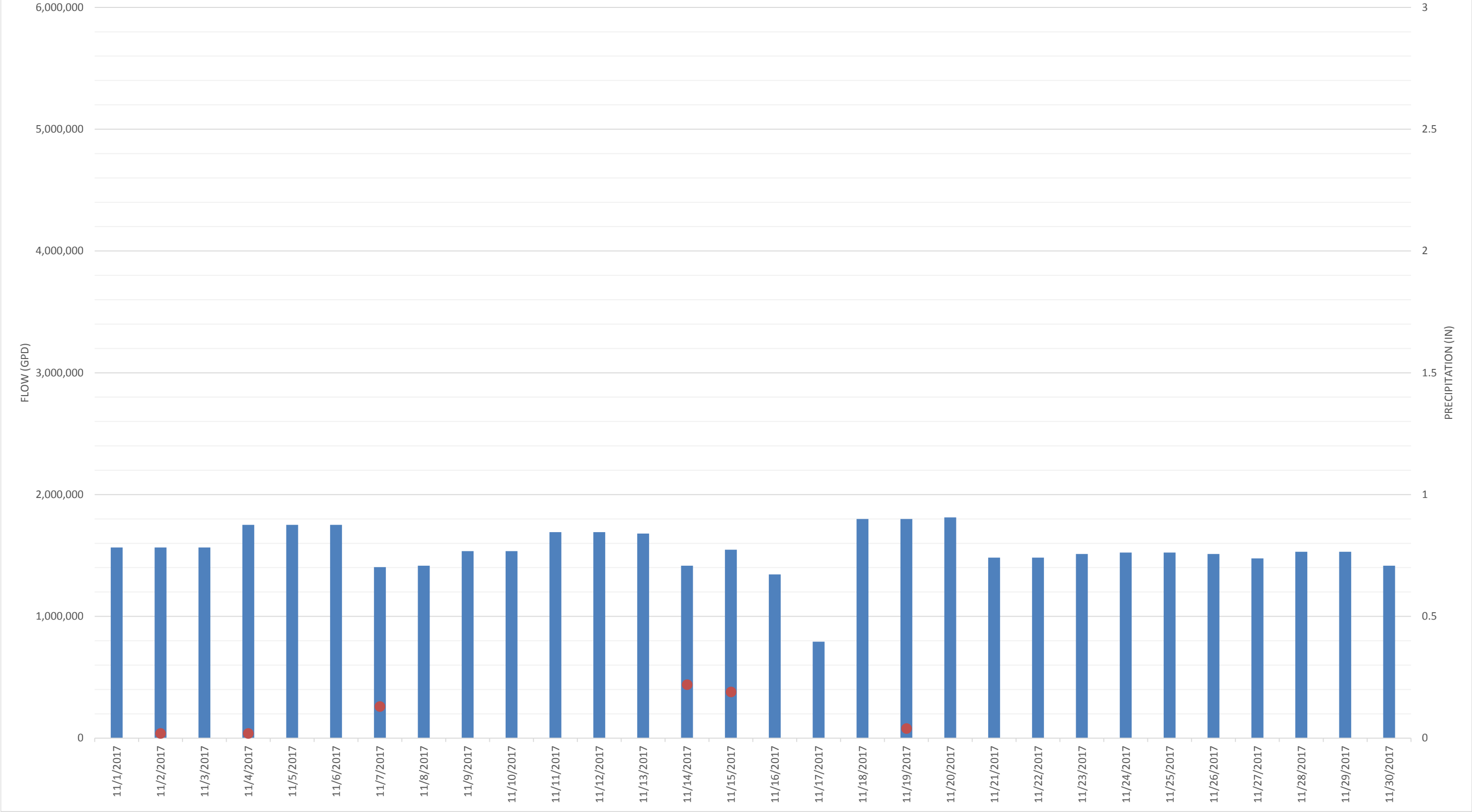
FASCO LIFT STATION DALIY FLOW

Flow Precipitation



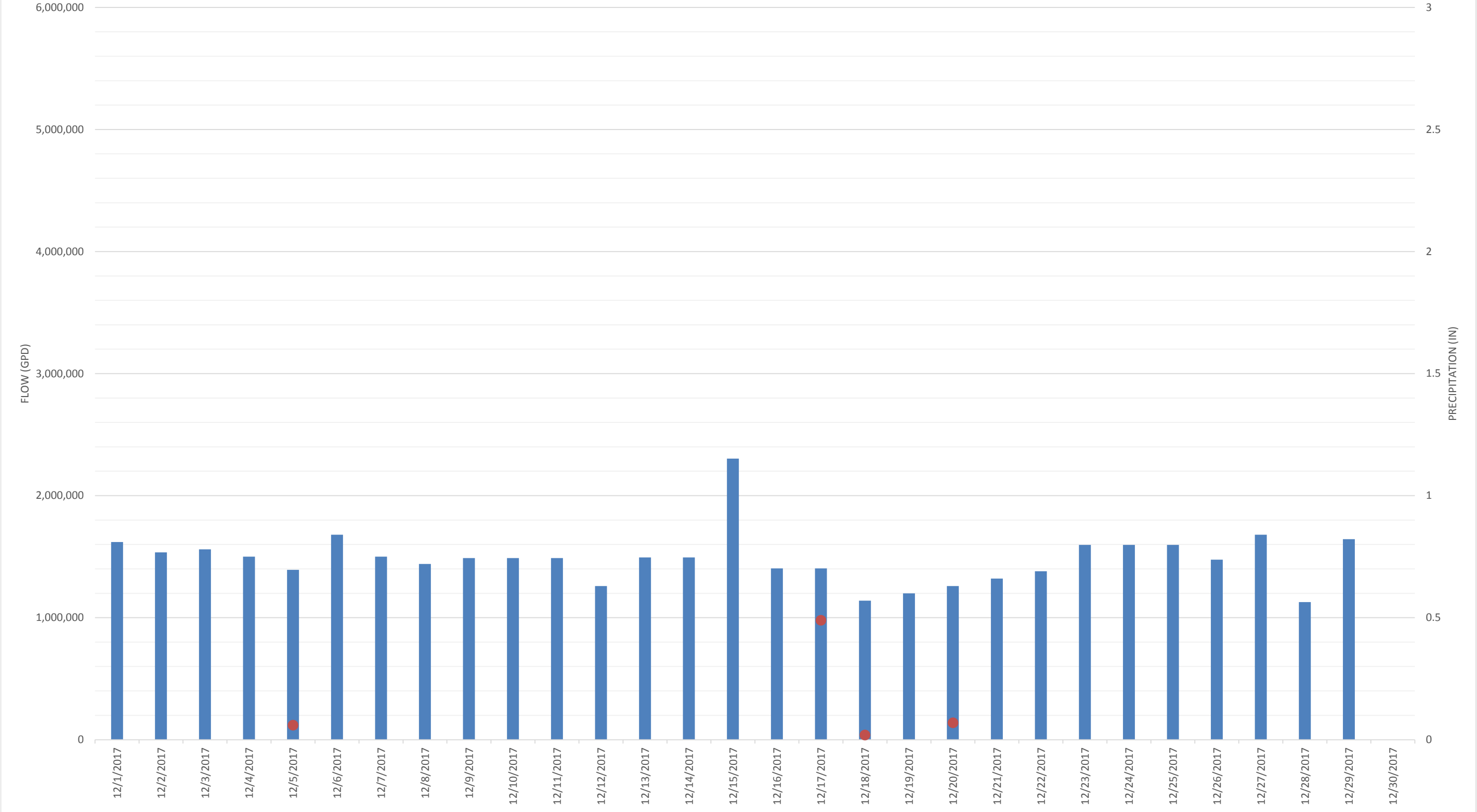
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



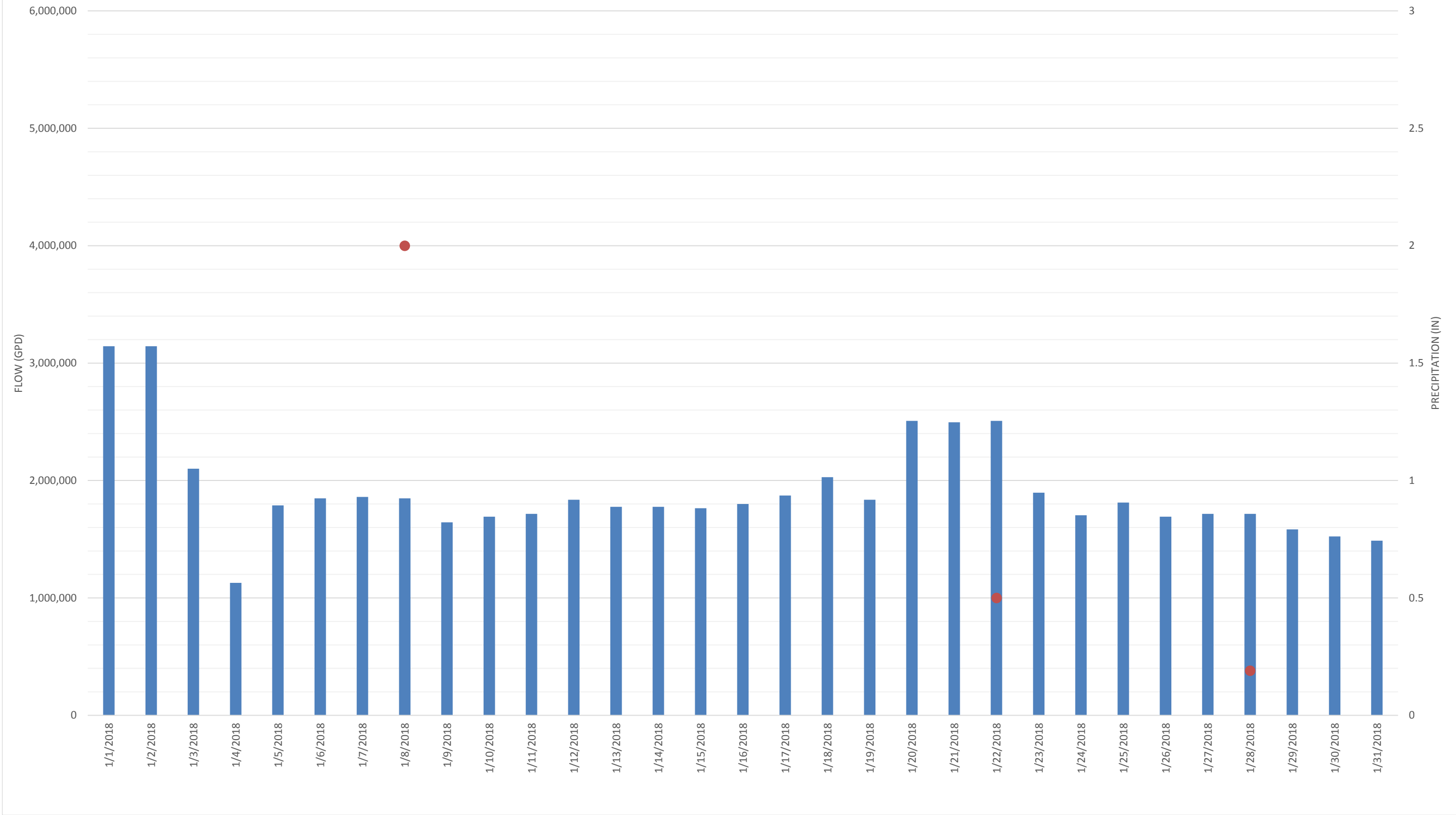
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



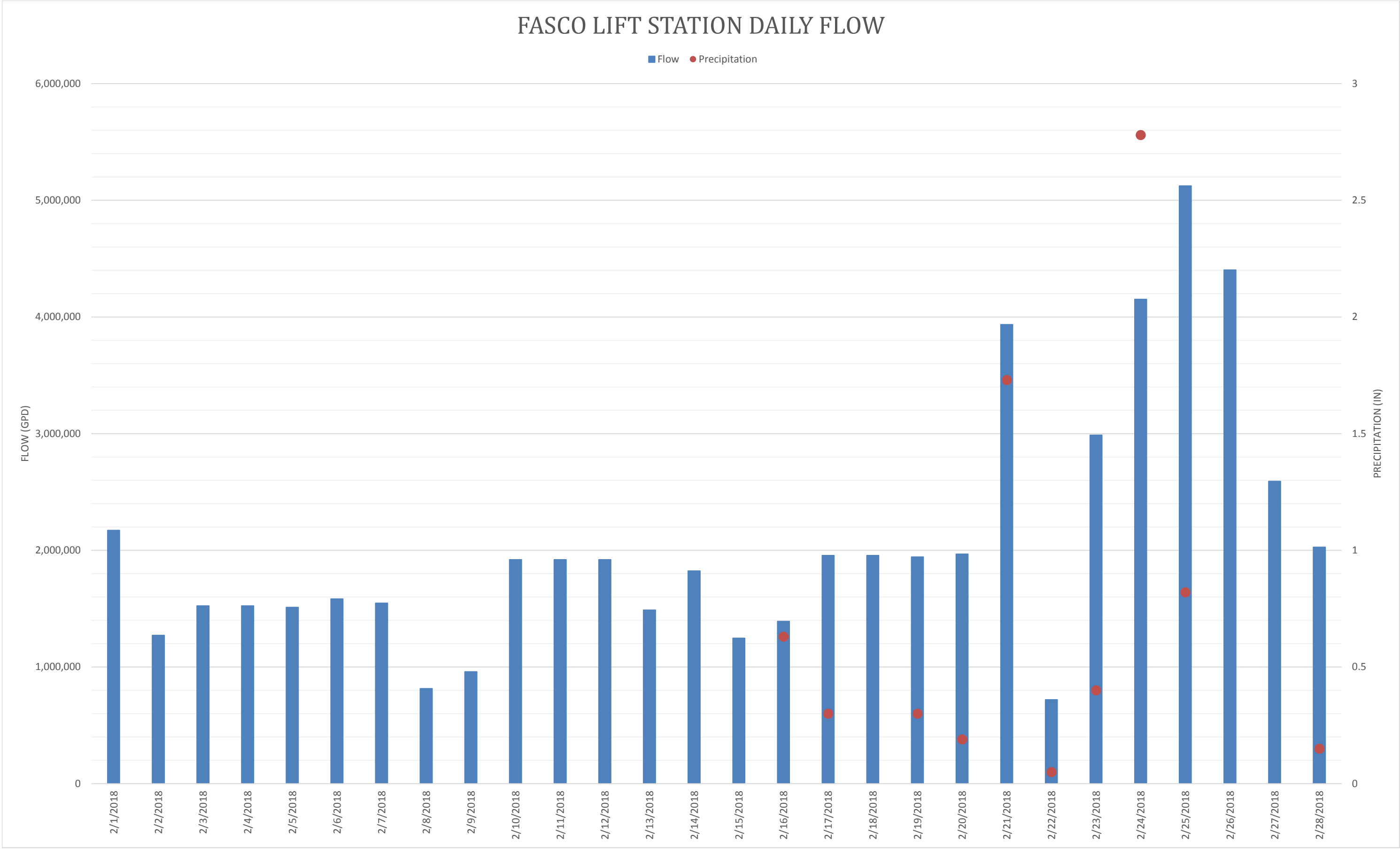
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



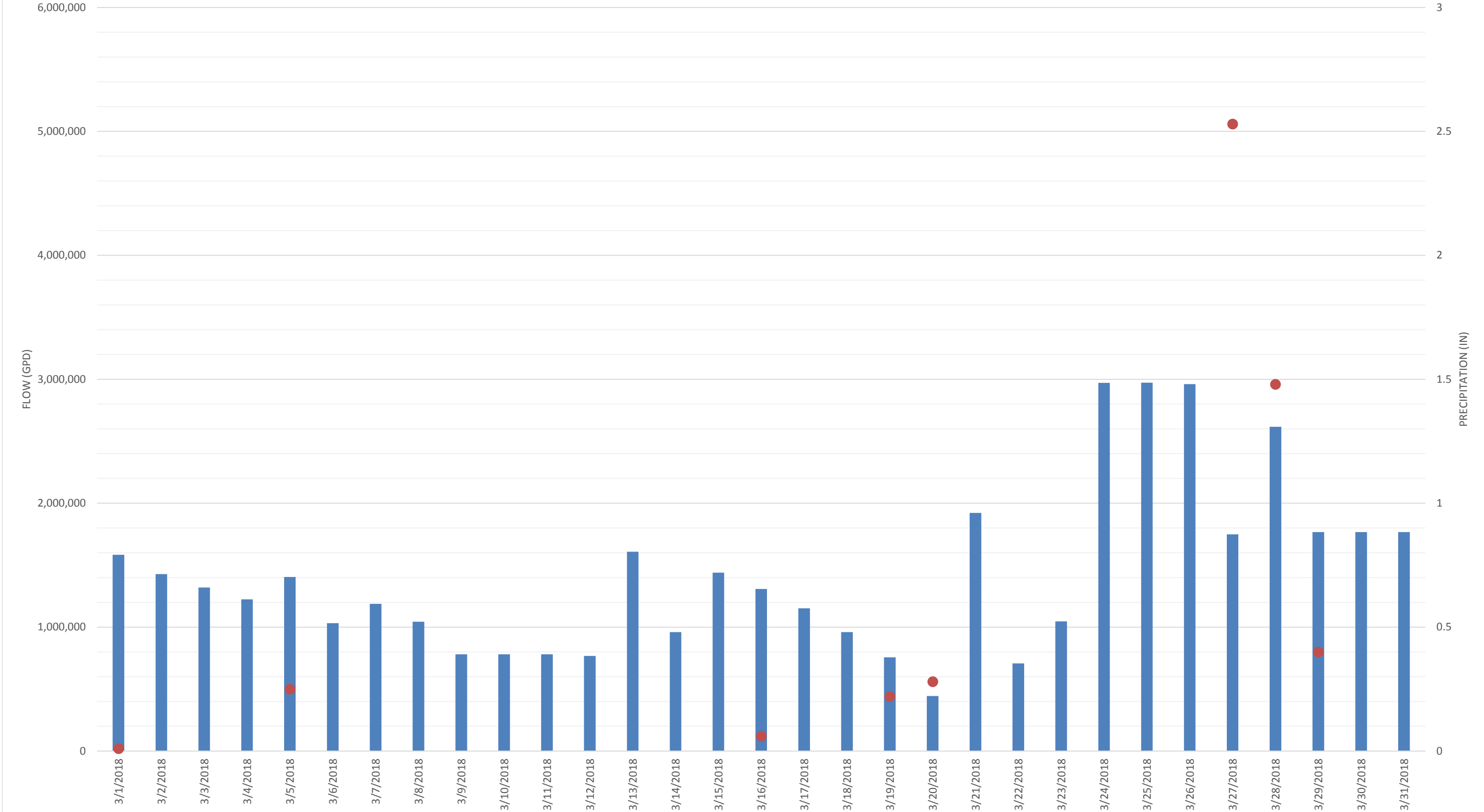
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



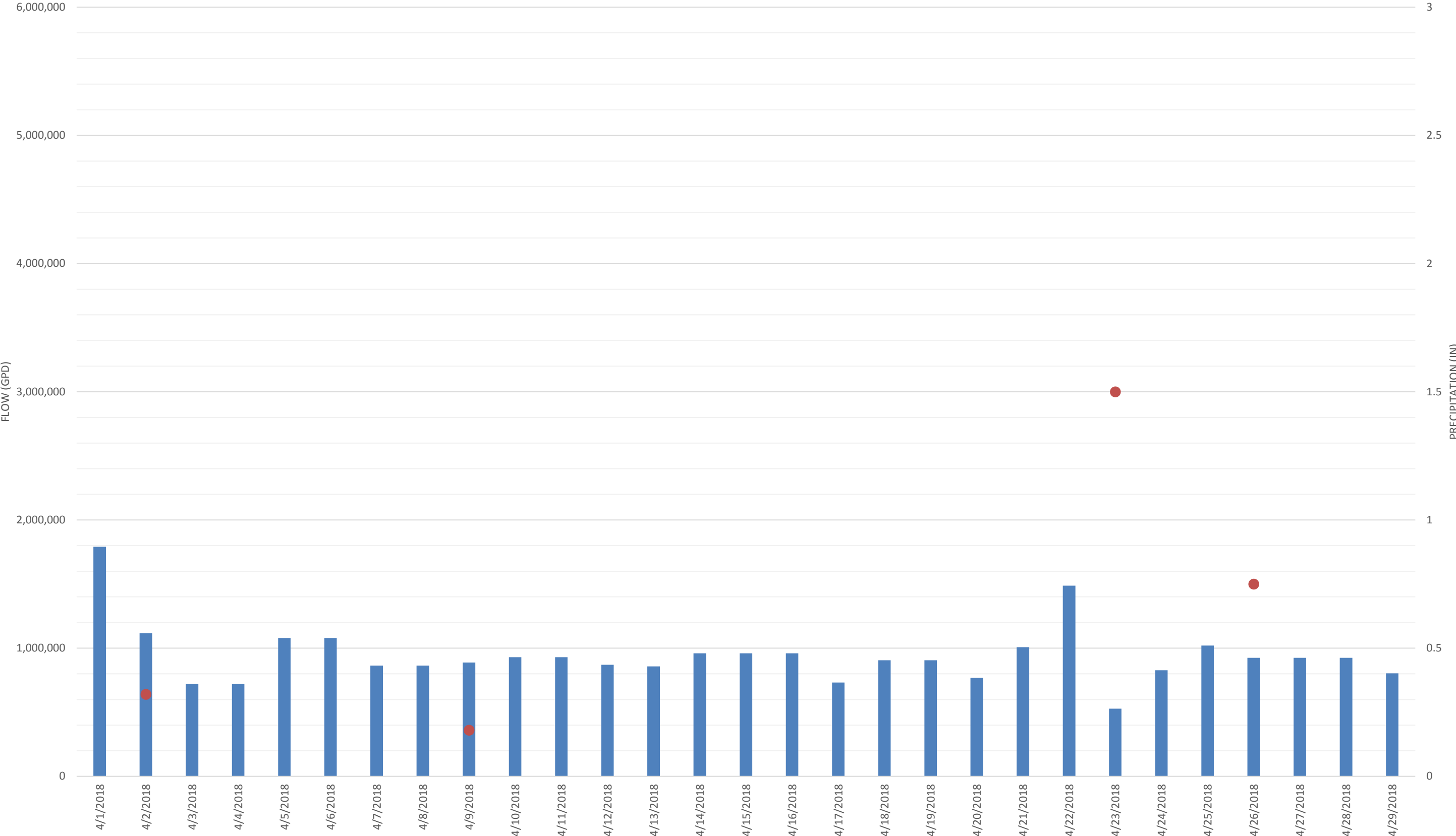
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



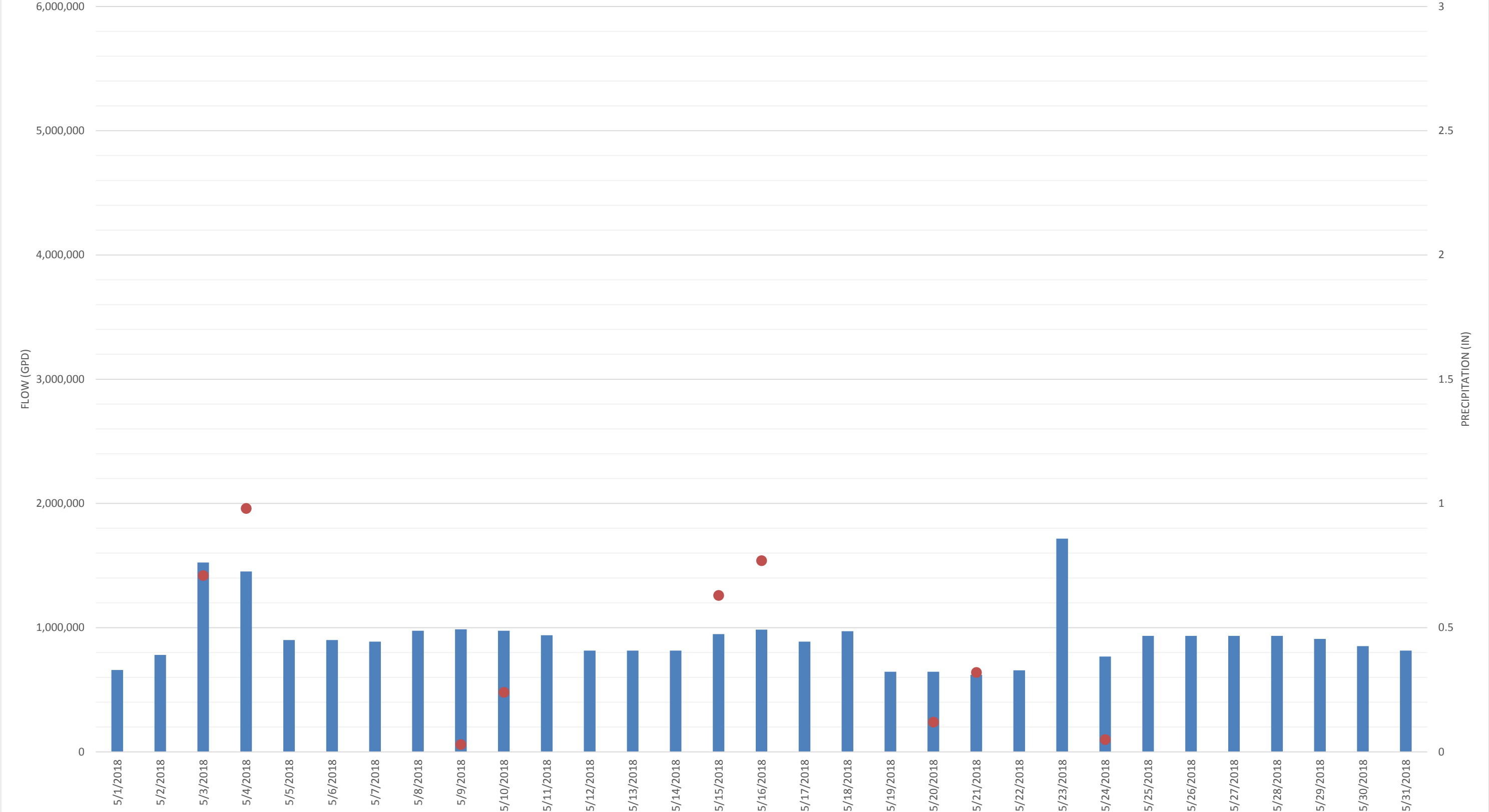
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



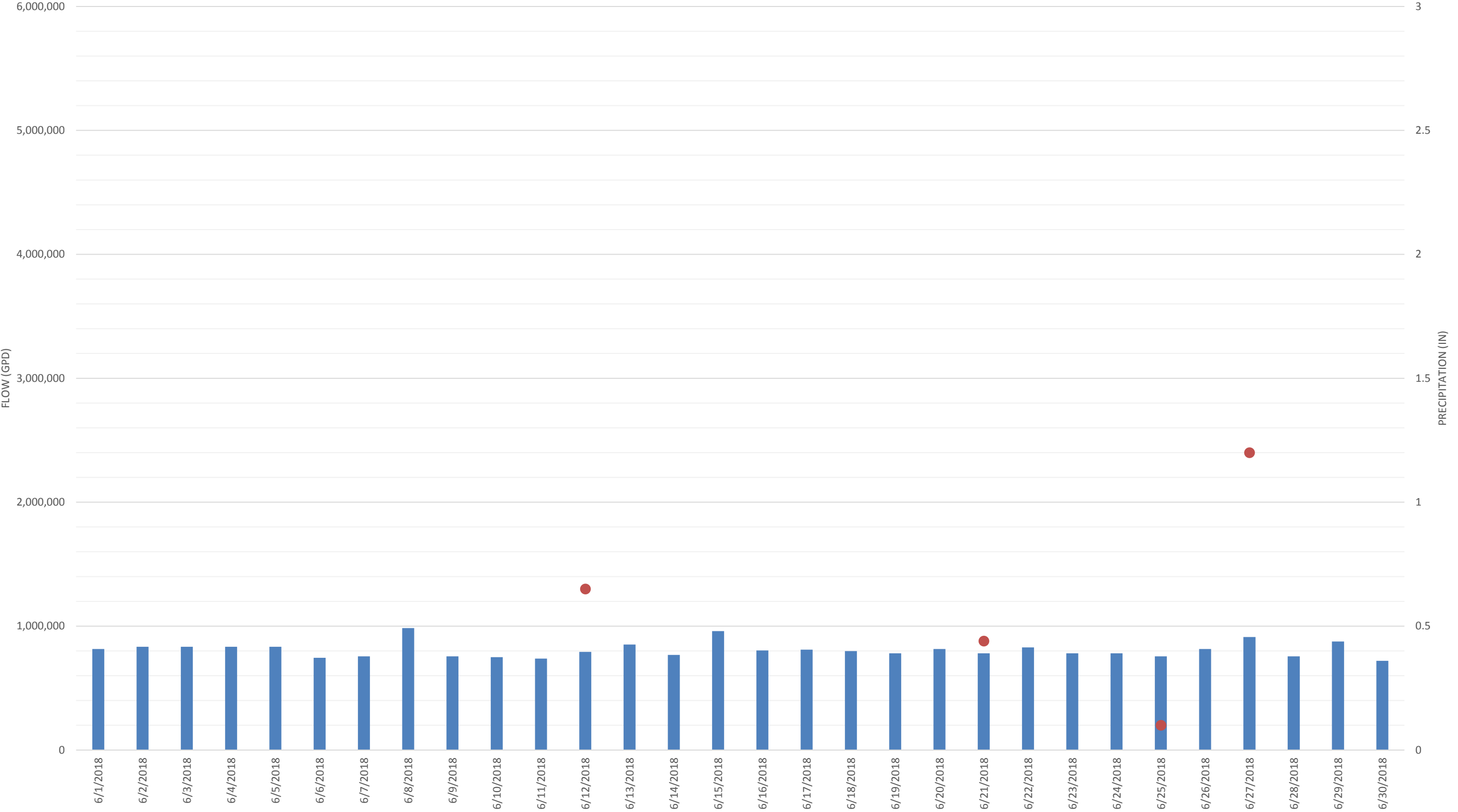
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



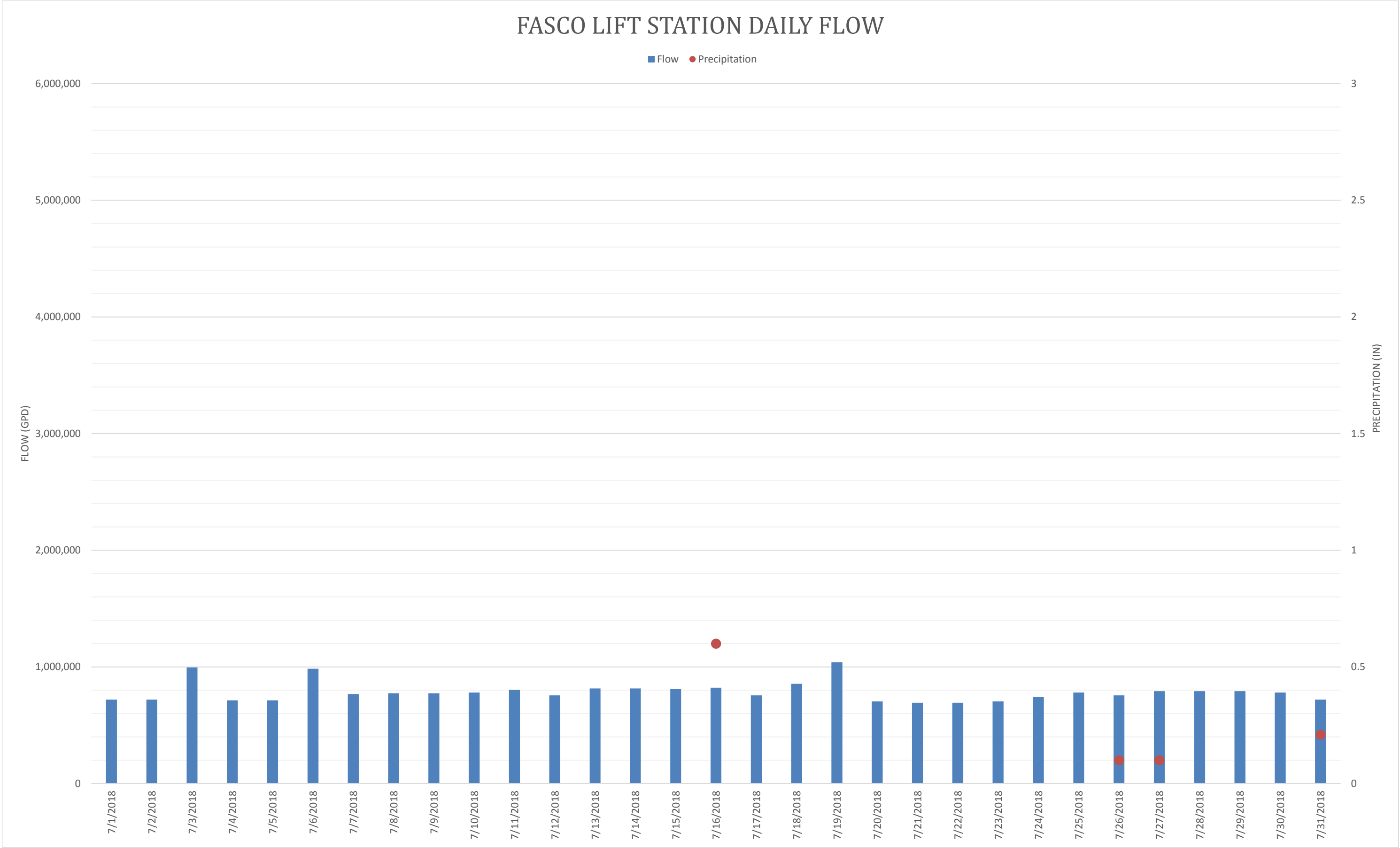
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



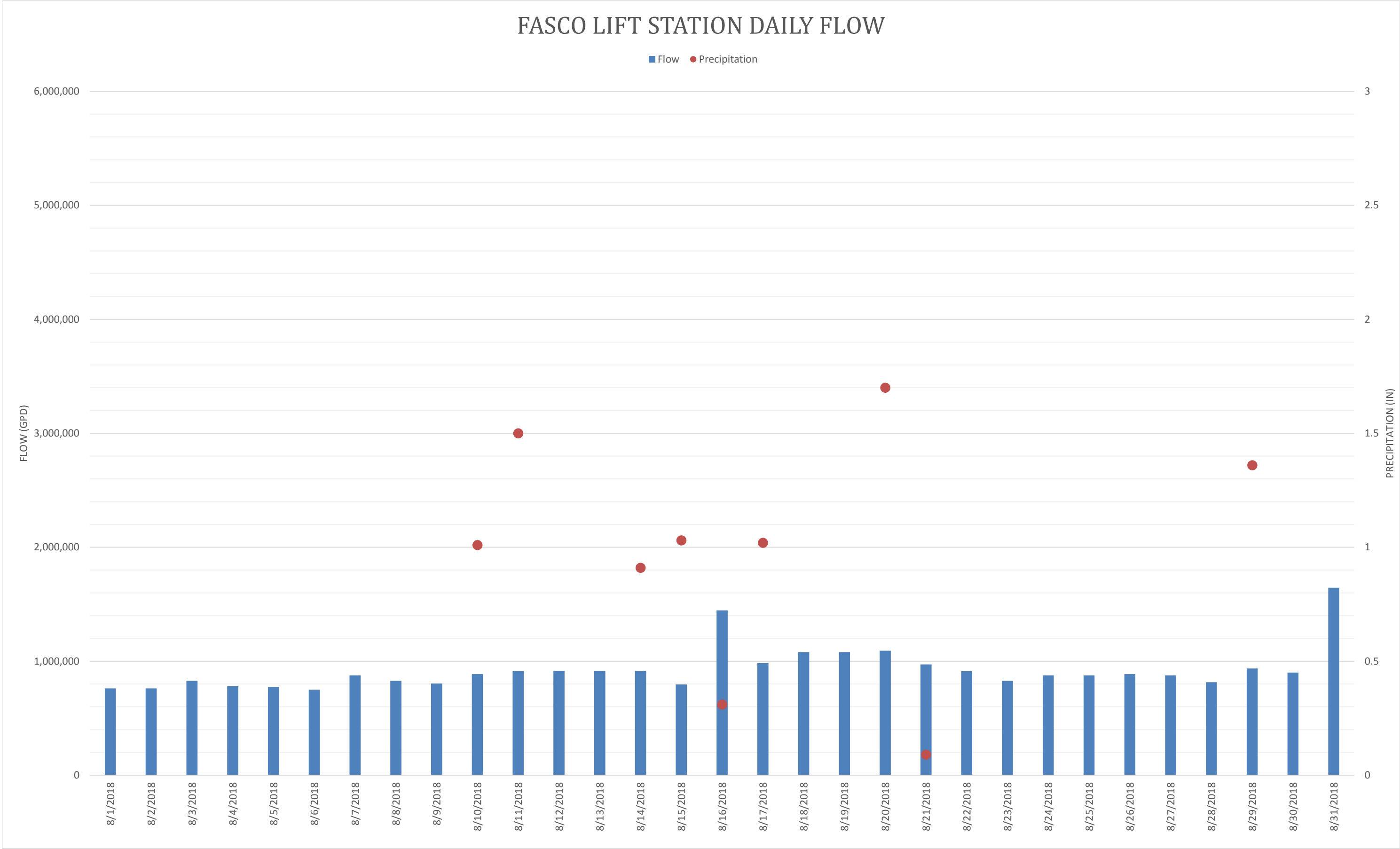
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



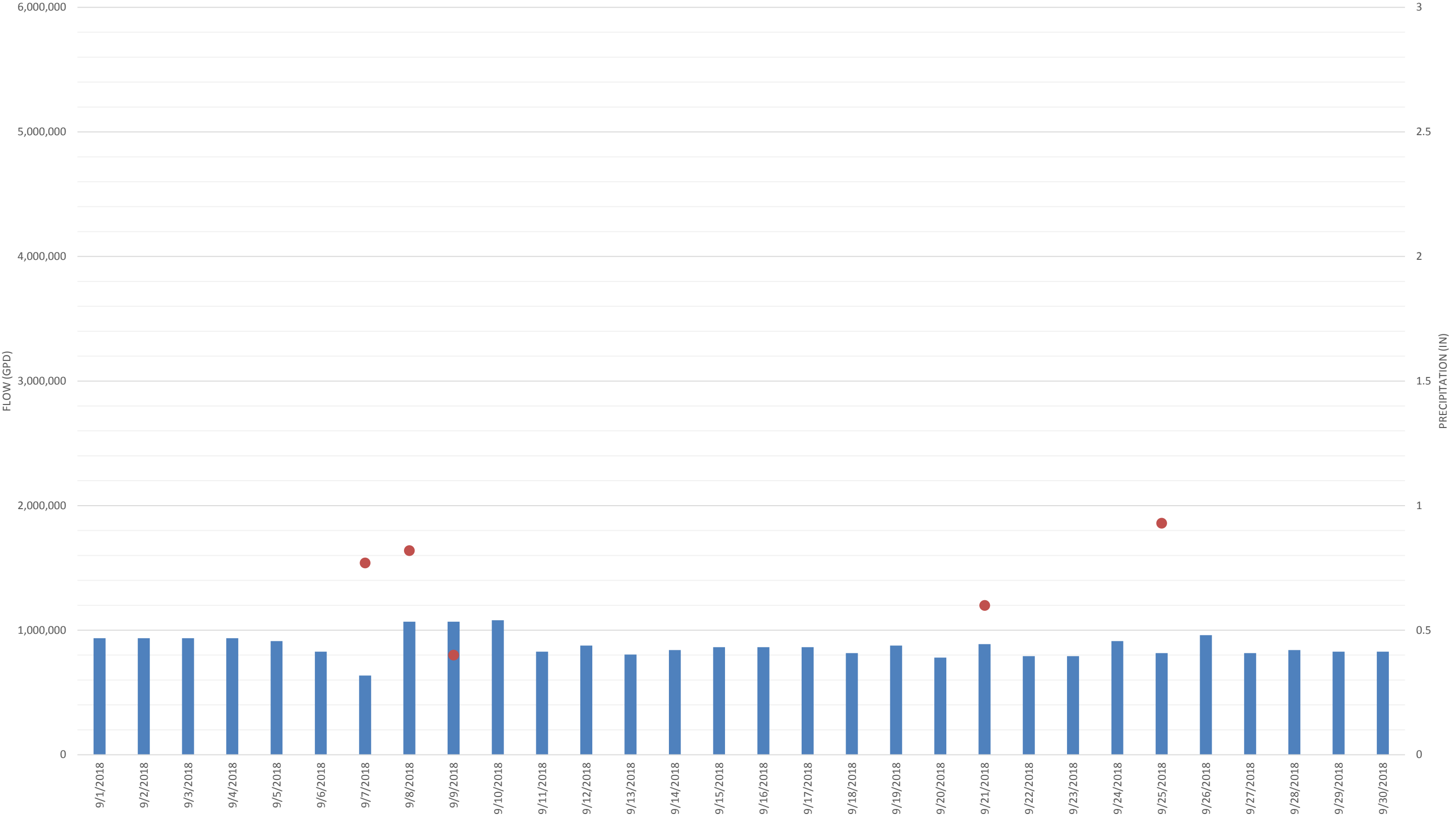
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



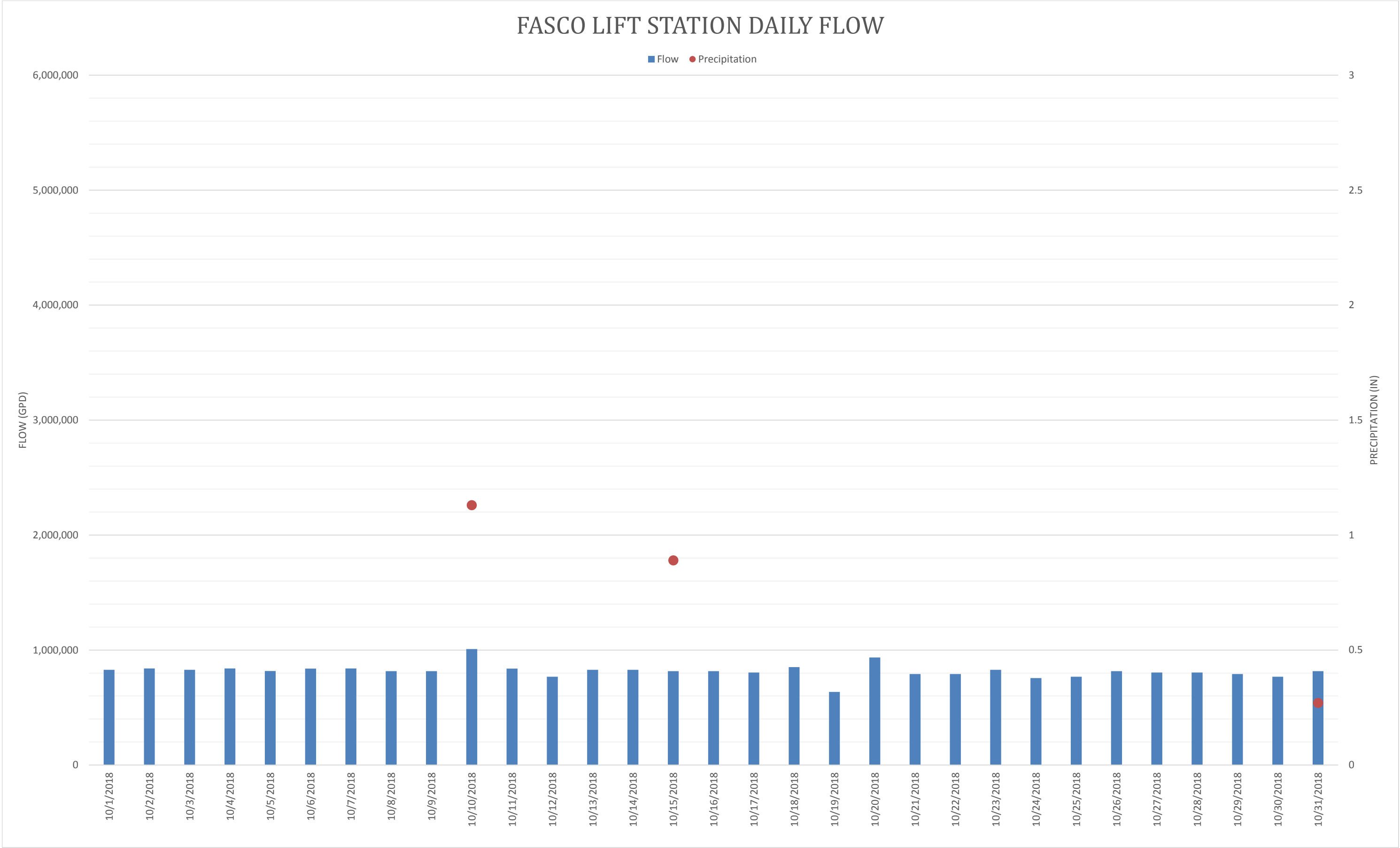
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



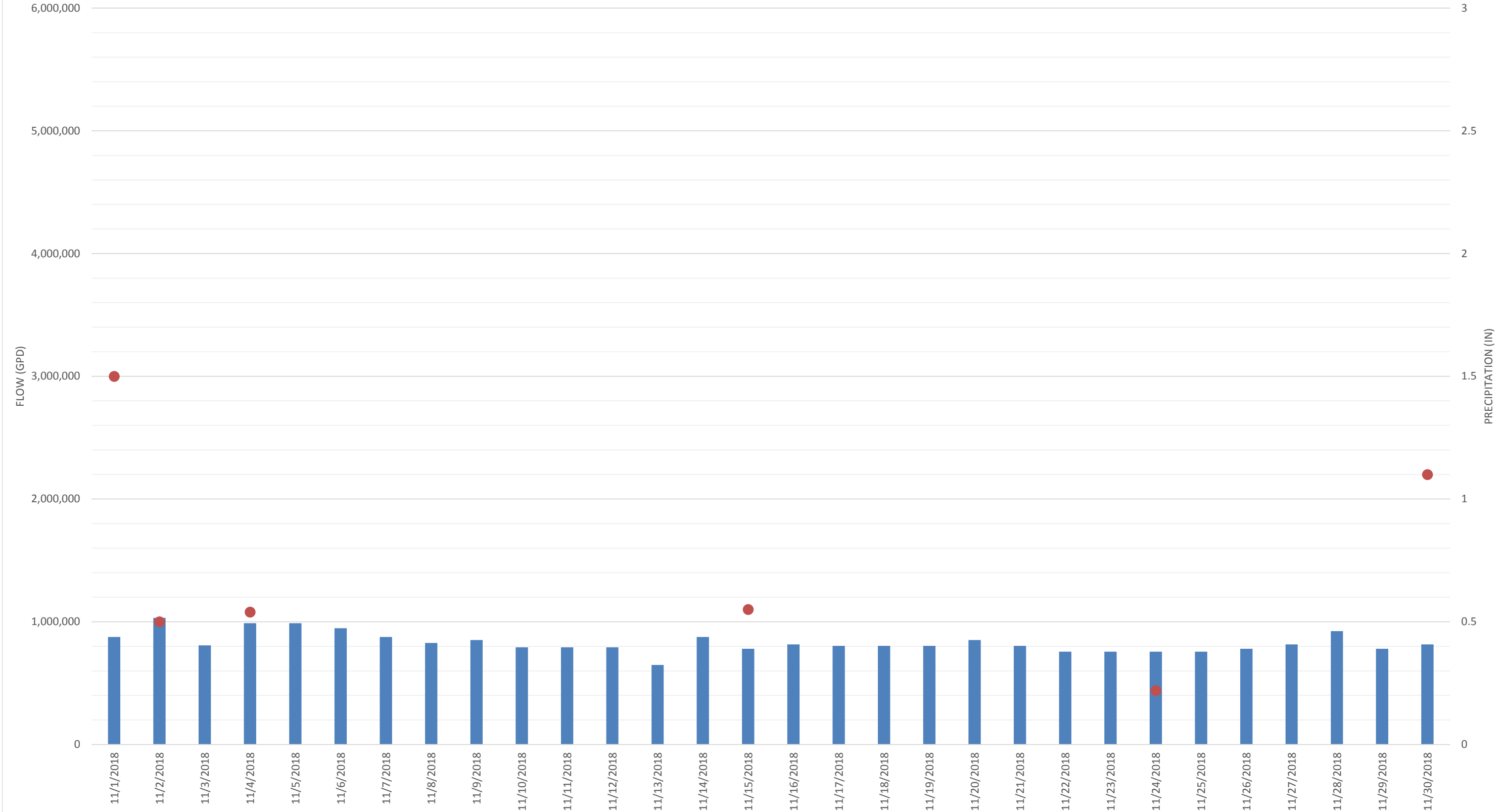
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



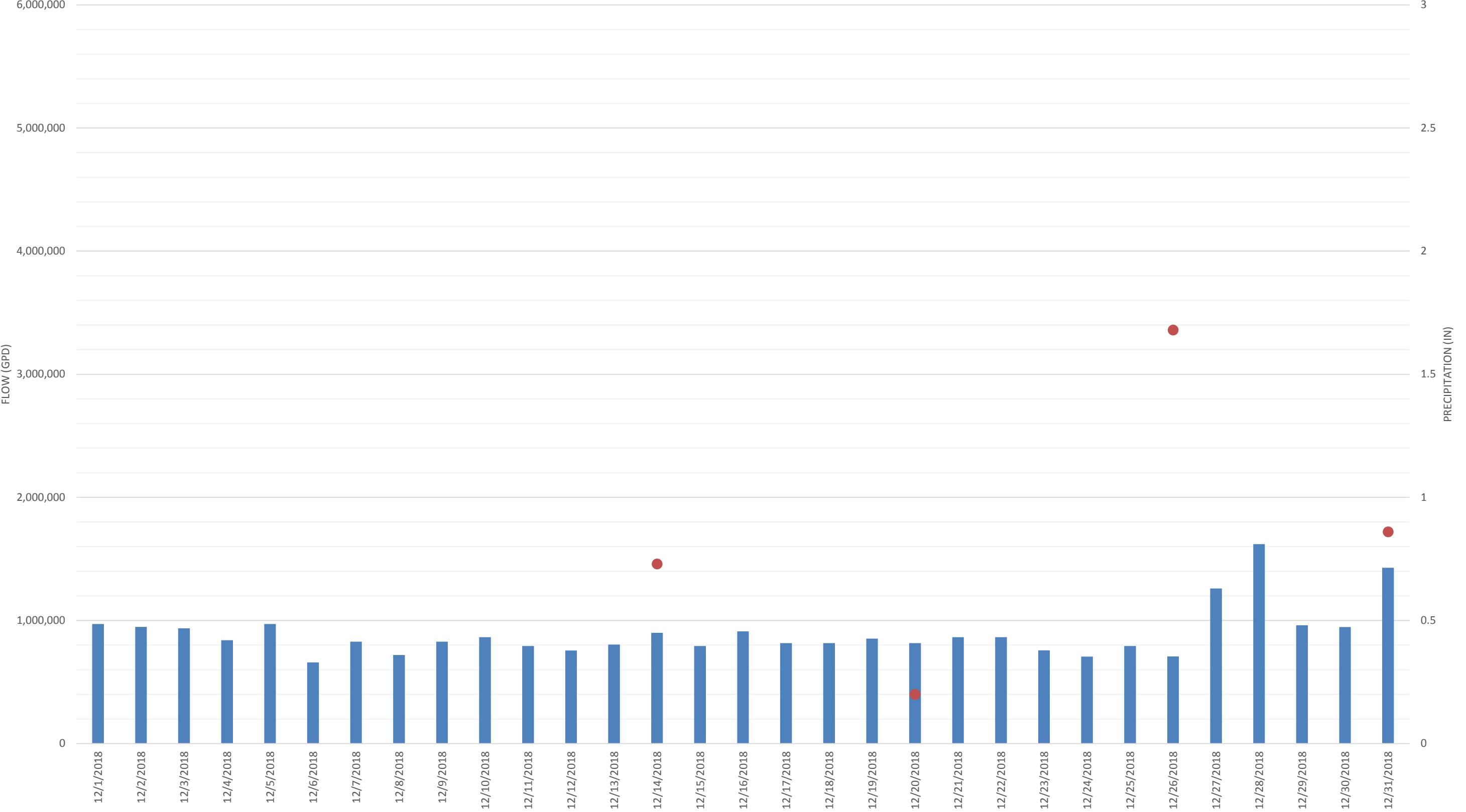
FASCO LIFT STATION DAILY FLOW

Flow Precipitation



FASCO LIFT STATION DAILY FLOW

Flow Precipitation

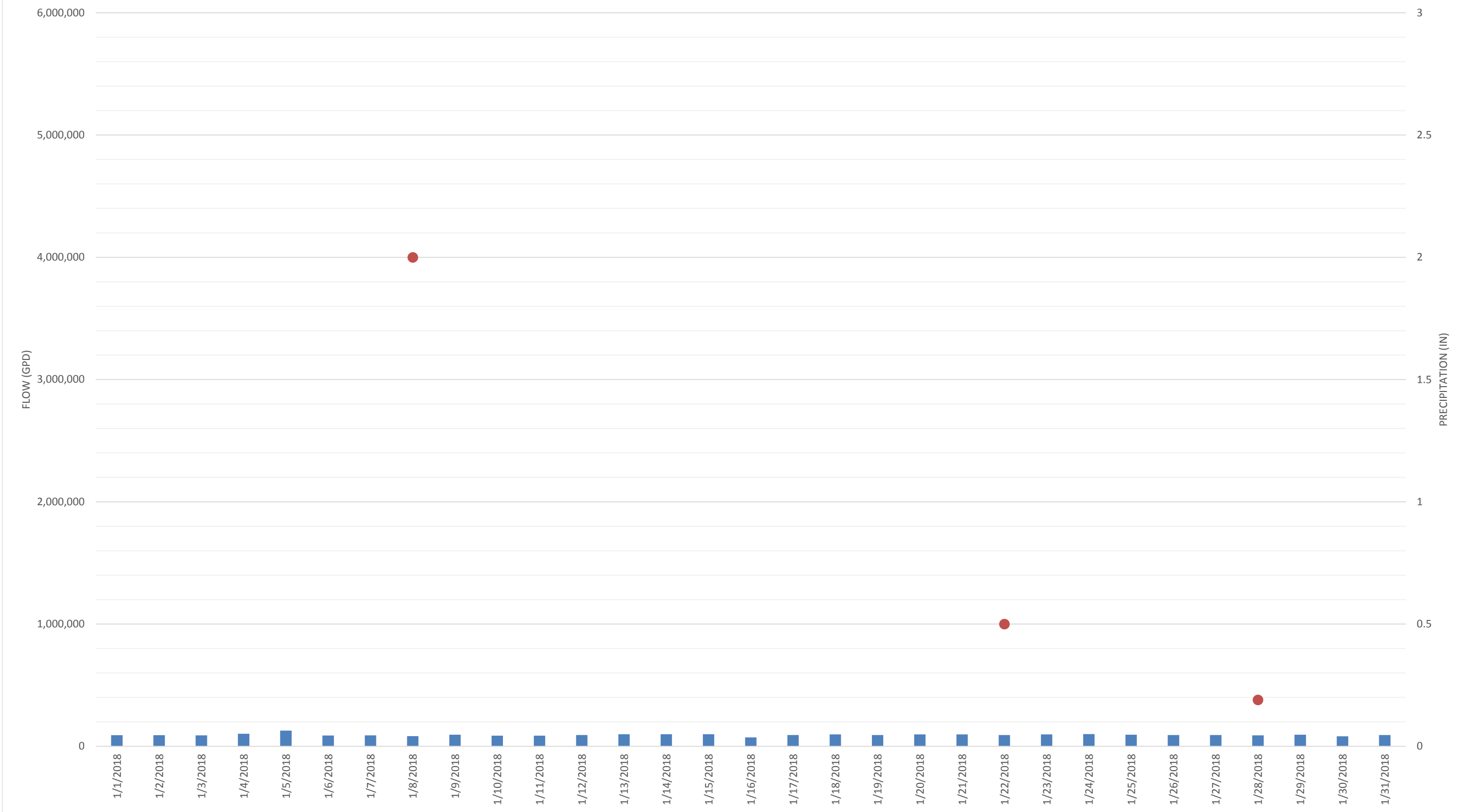


APPENDIX K
OTC LIFT STATION FLOW DATA

DRAFT

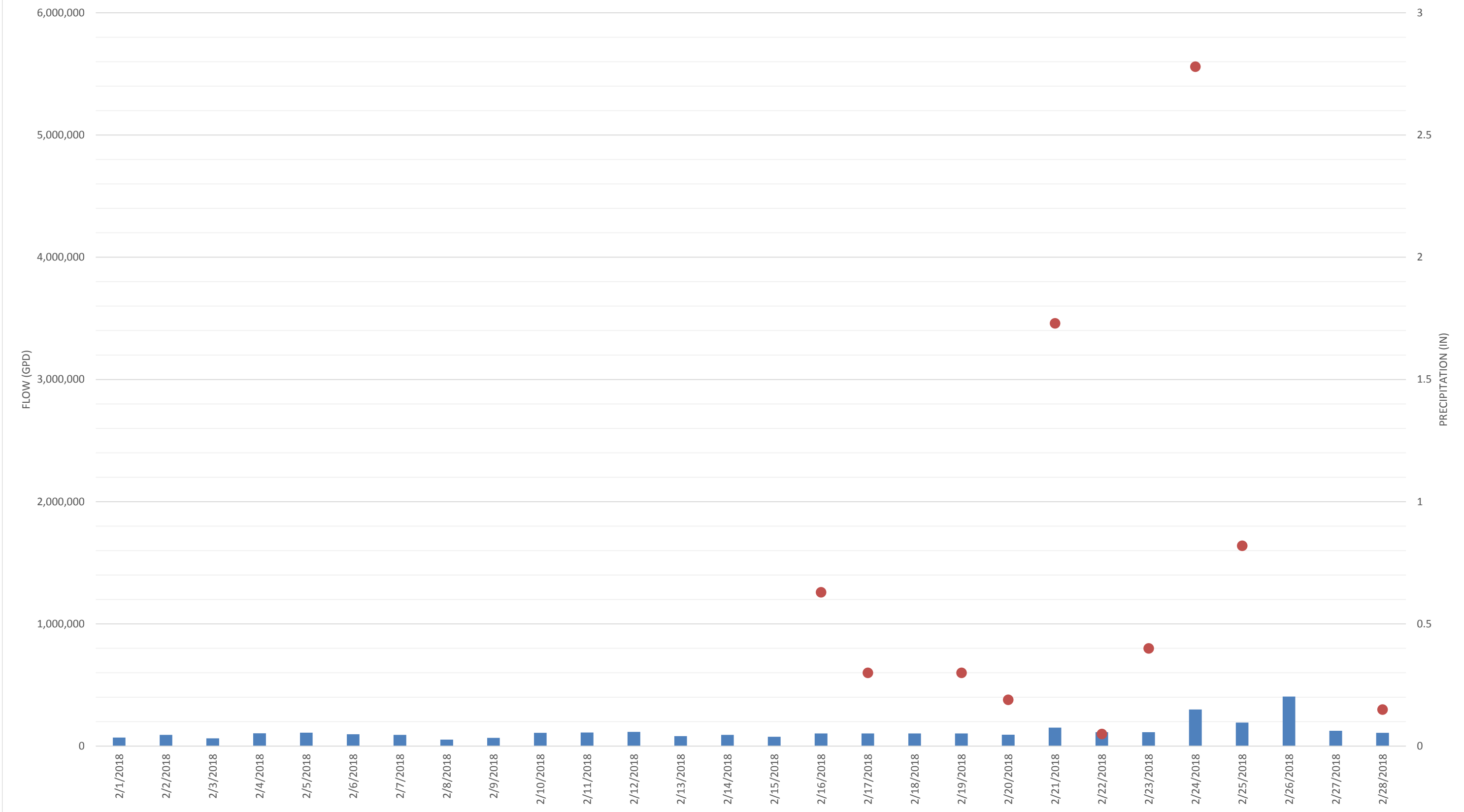
OTC LIFT STATION DAILY FLOW

Flow Precipitation



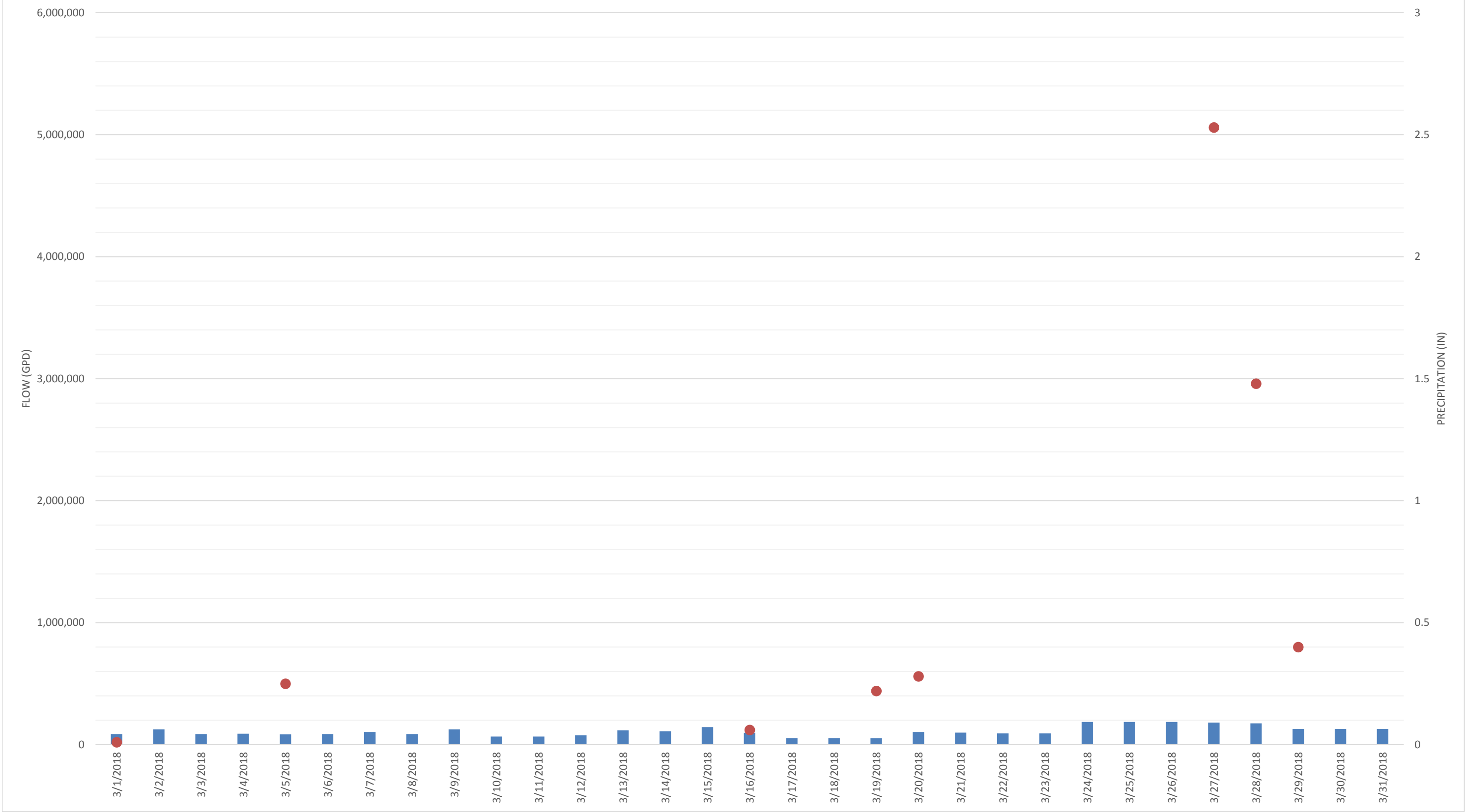
OTC LIFT STATION DAILY FLOW

Flow Precipitation



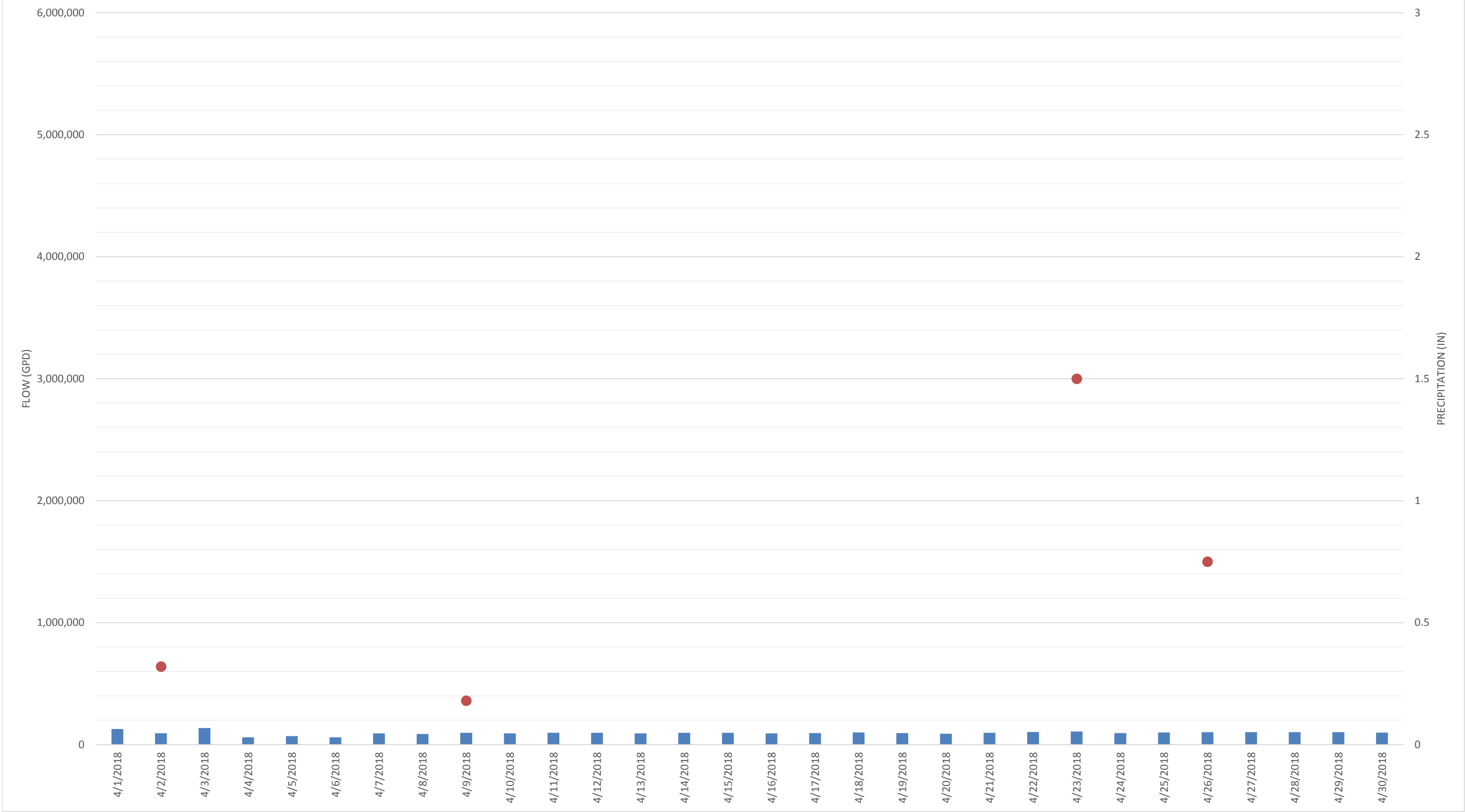
OTC LIFT STATION DAILY FLOW

Flow Precipitation



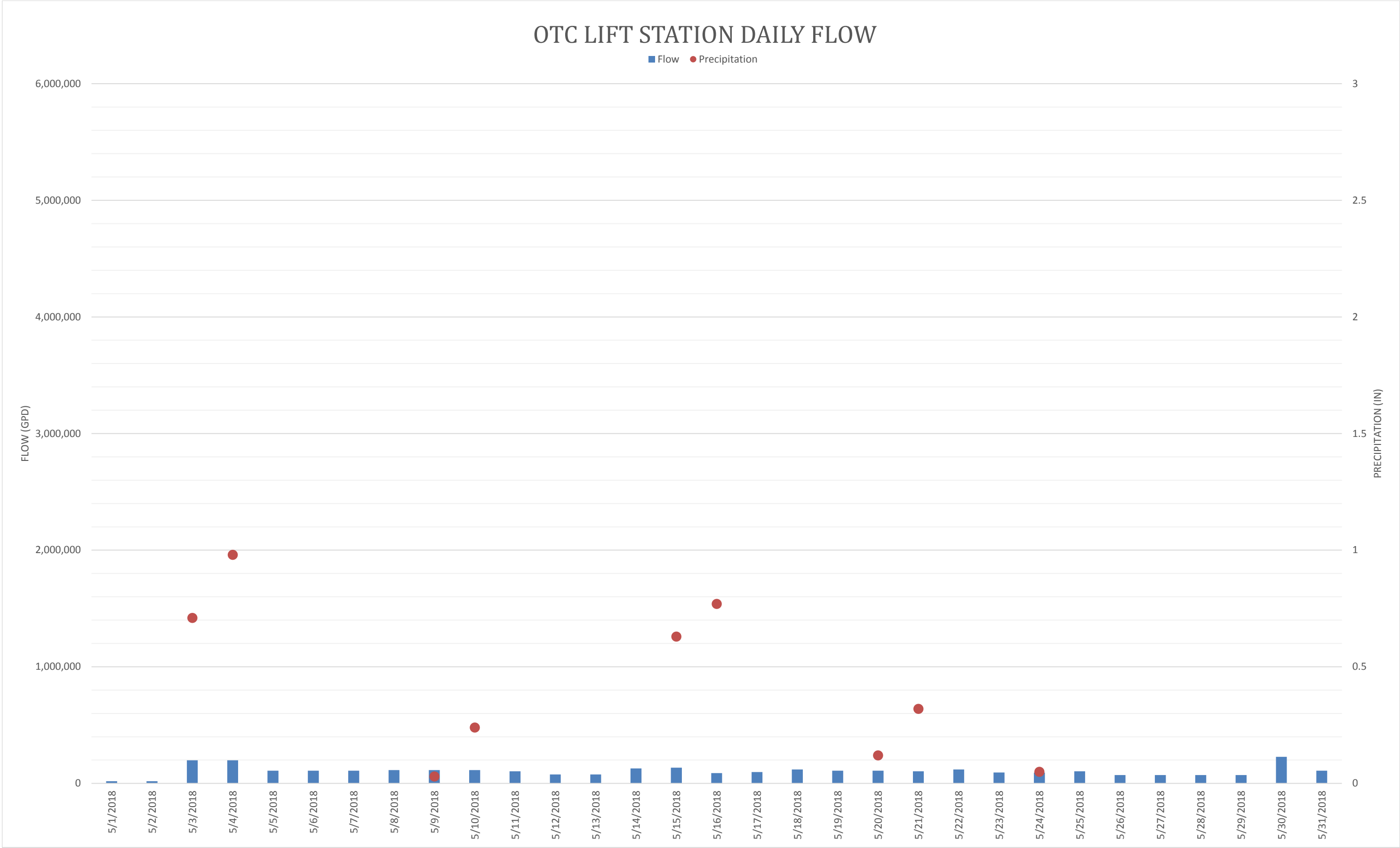
OTC LIFT STATION DAILY FLOW

Flow Precipitation



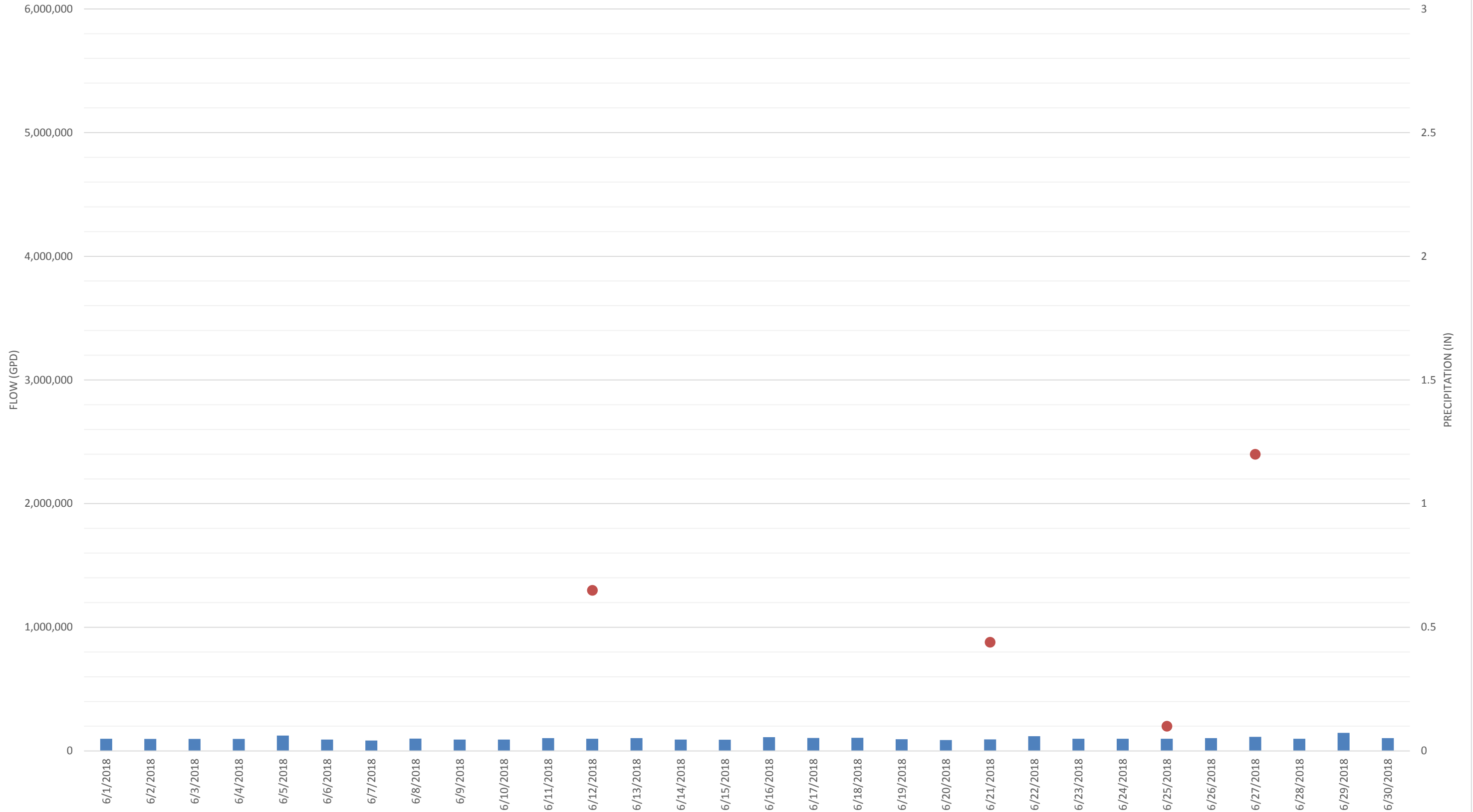
OTC LIFT STATION DAILY FLOW

Flow Precipitation



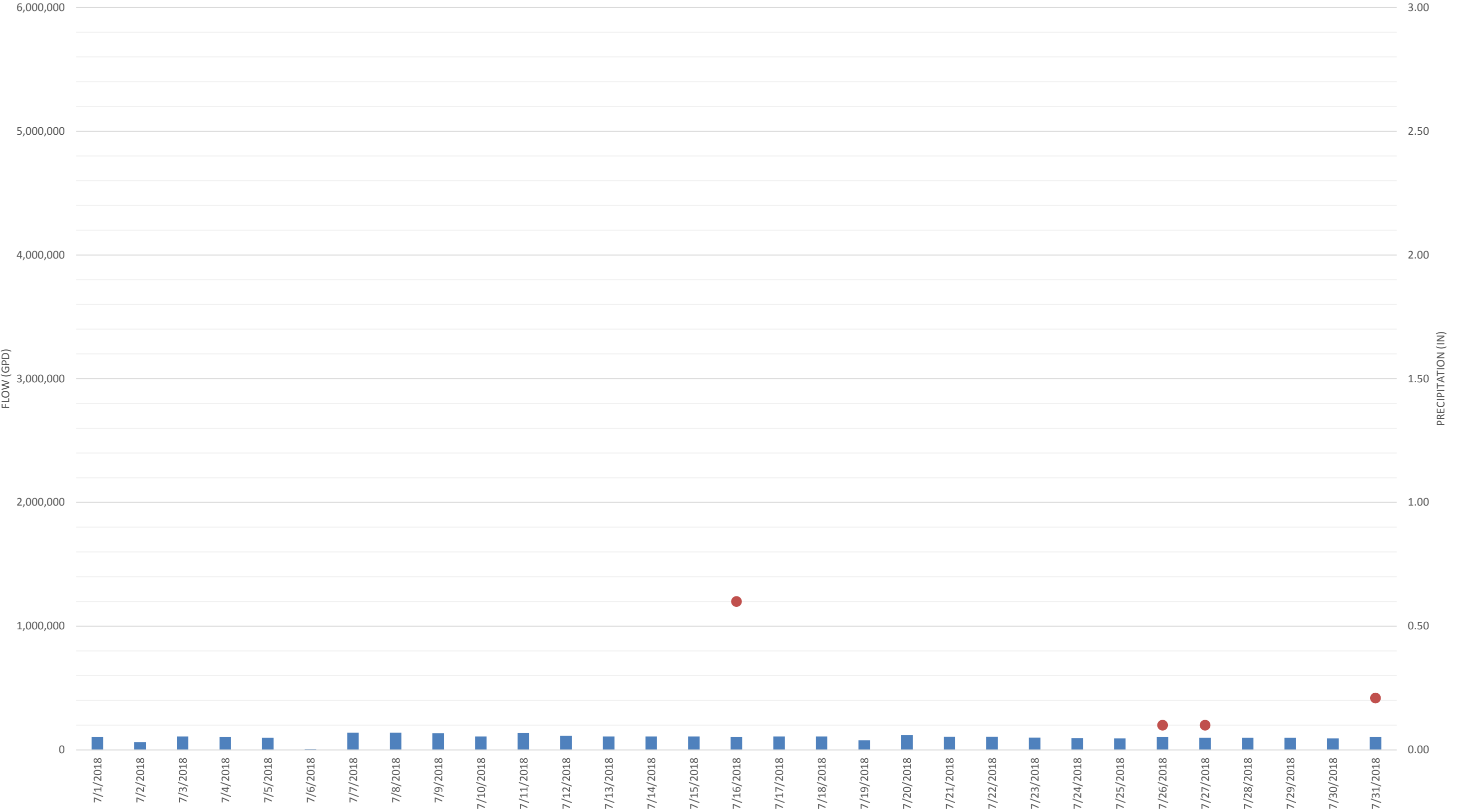
OTC LIFT STATION DAILY FLOW

■ Flow ● Precipitation



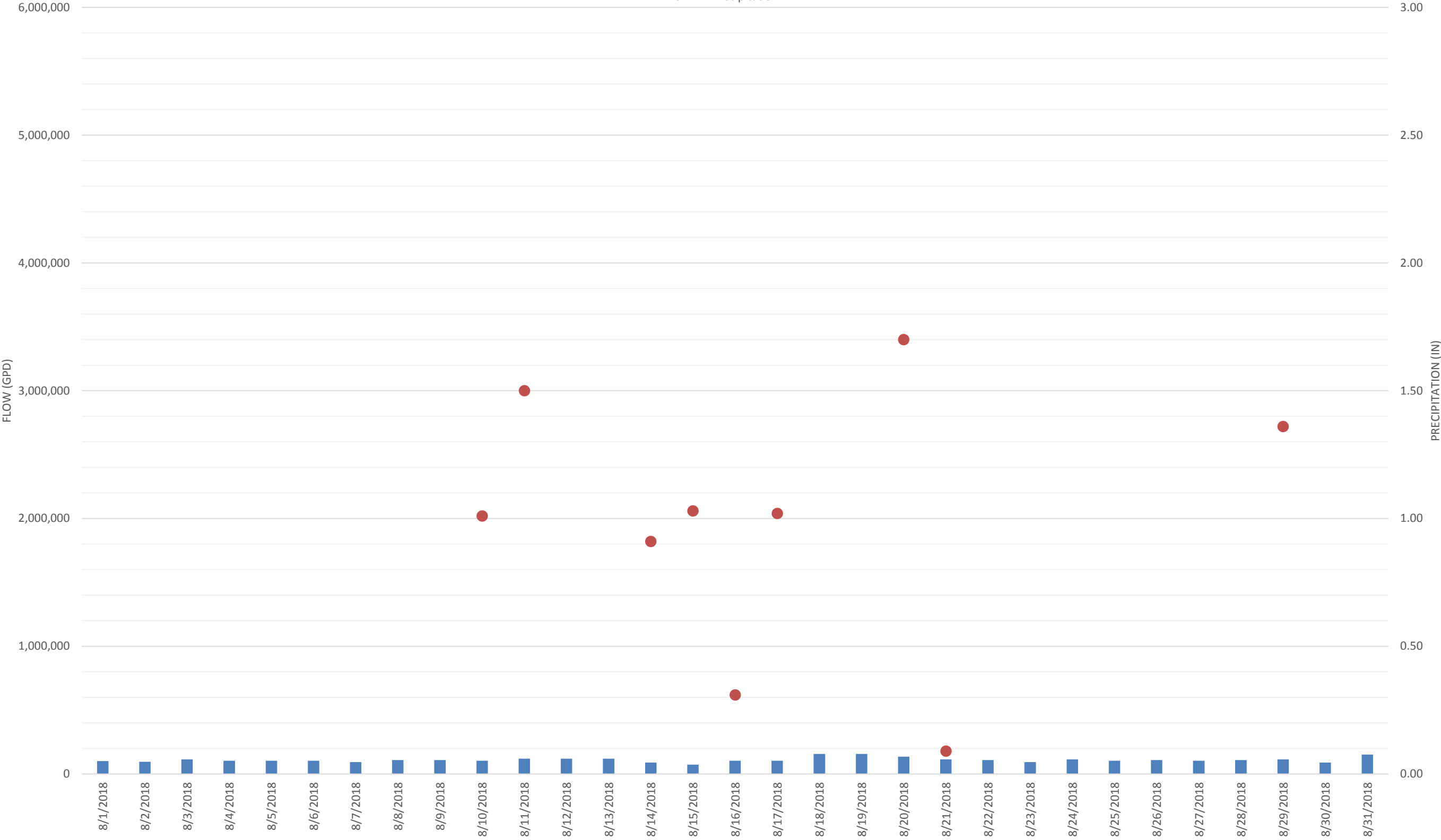
OTC LIFT STATION DAILY FLOW

Flow Precipitation



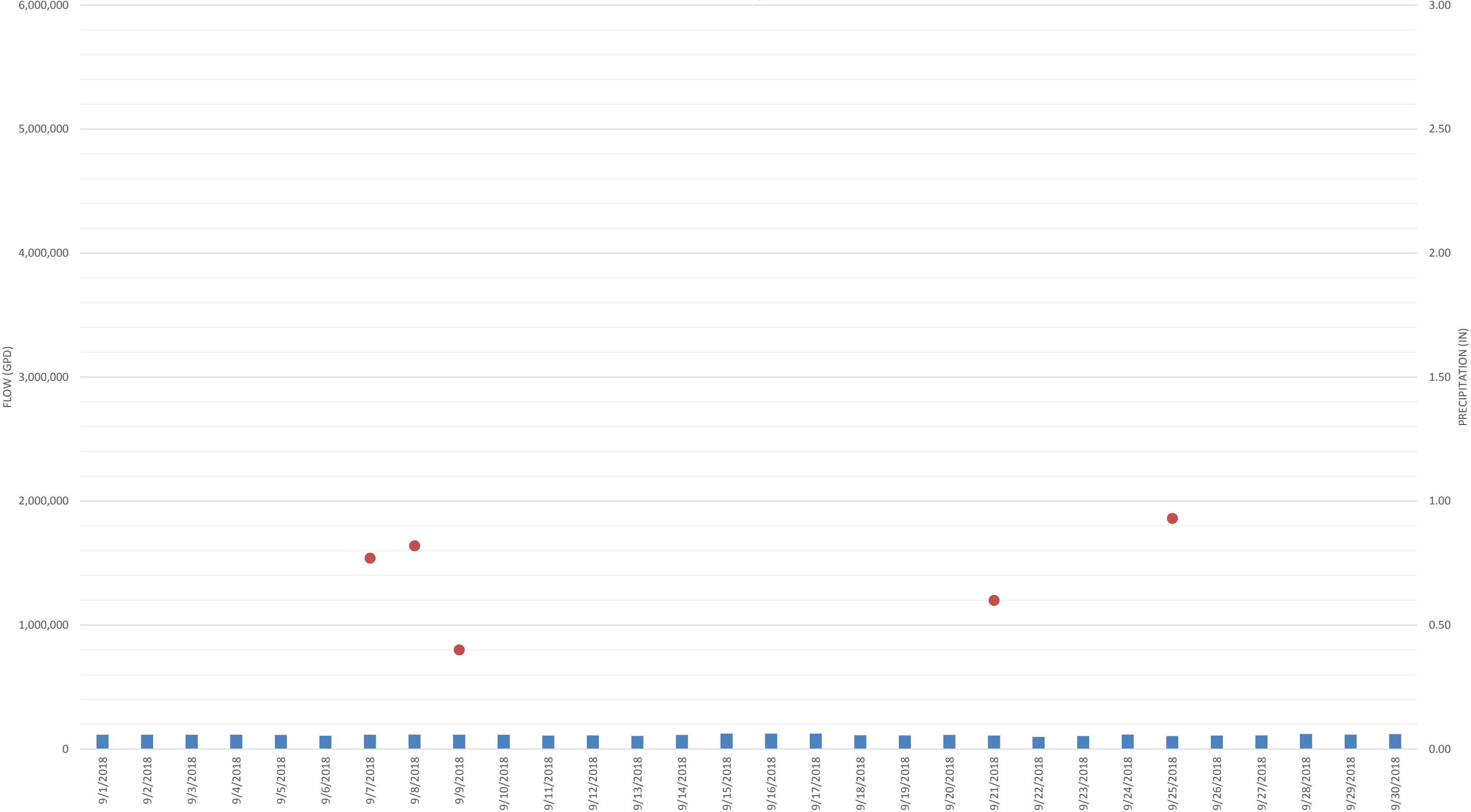
OTC LIFT STATION DAILY FLOW

Flow Precipitation



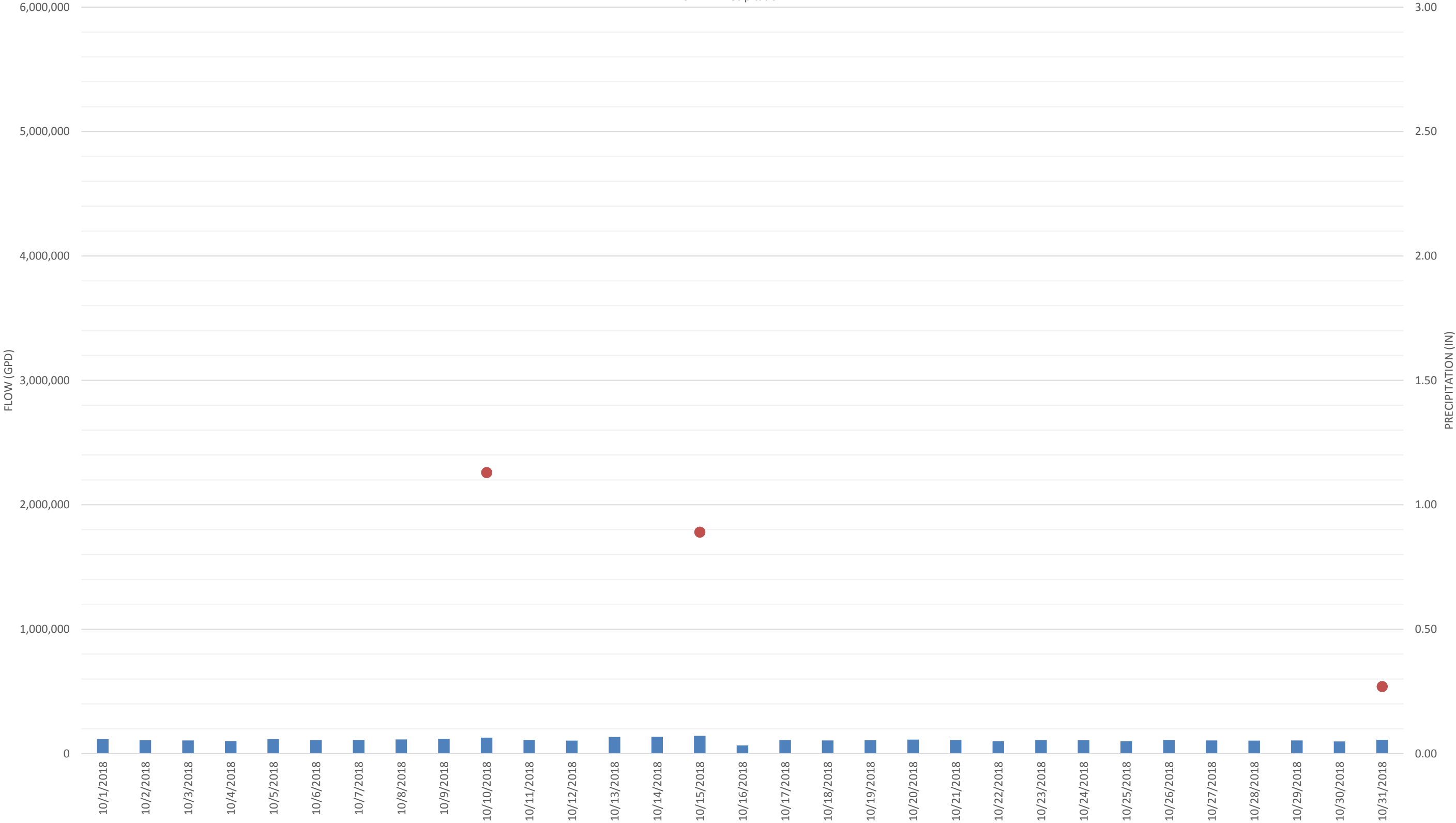
OTC LIFT STATION DAILY FLOW

Flow Precipitation



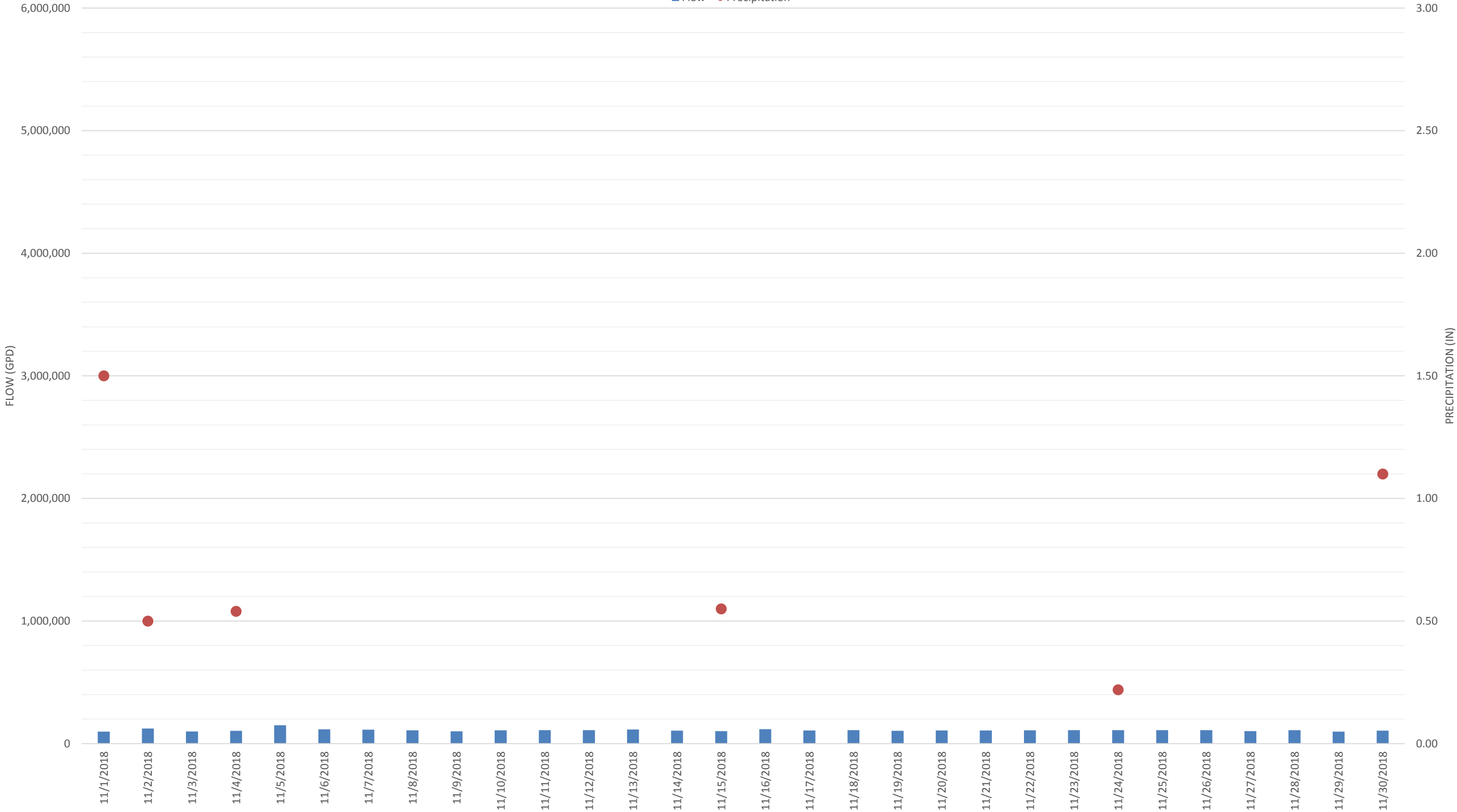
OTC LIFT STATION DAILY FLOW

Flow Precipitation



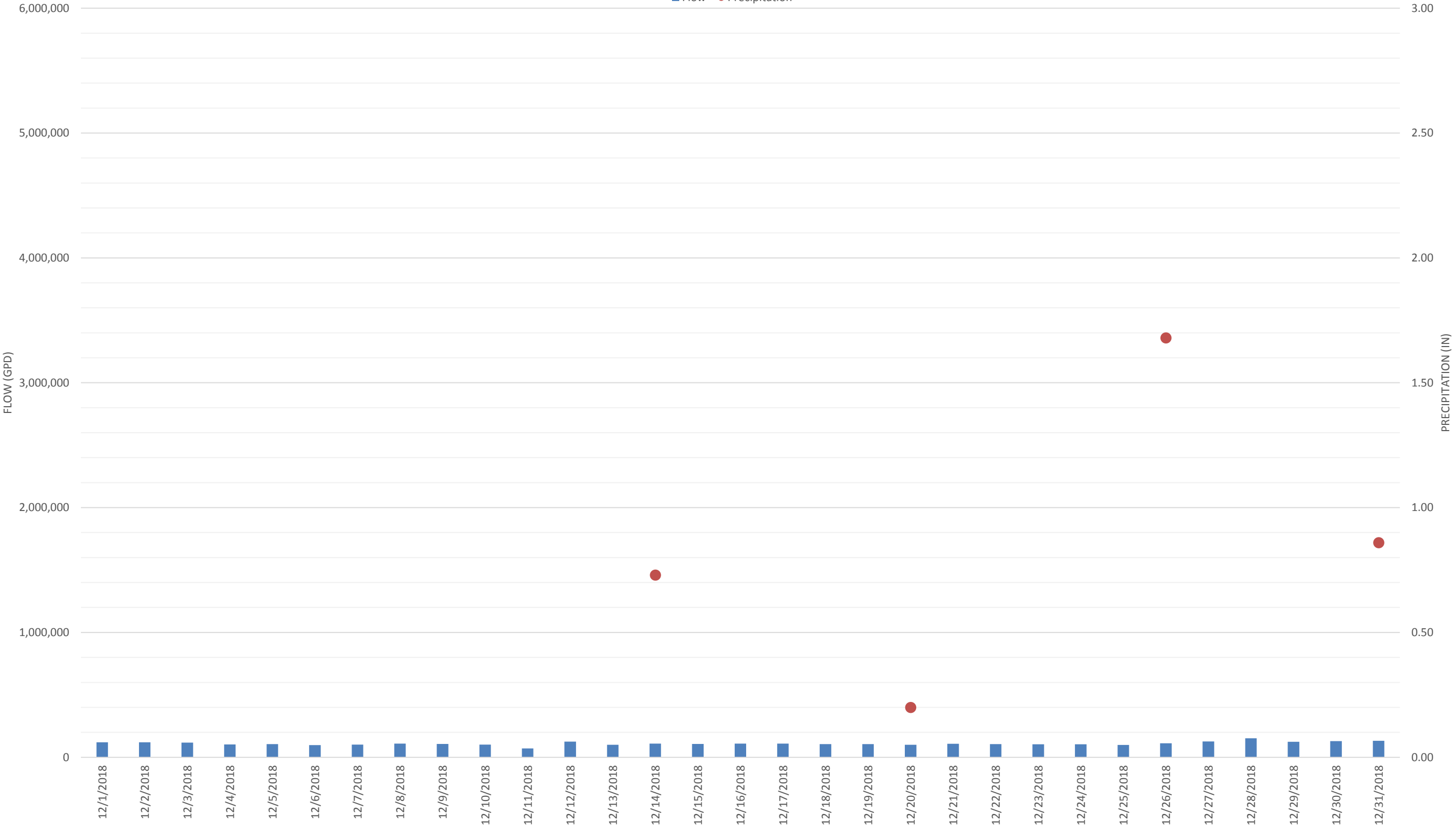
OTC LIFT STATION DAILY FLOW

Flow Precipitation



OTC LIFT STATION DAILY FLOW

■ Flow ● Precipitation

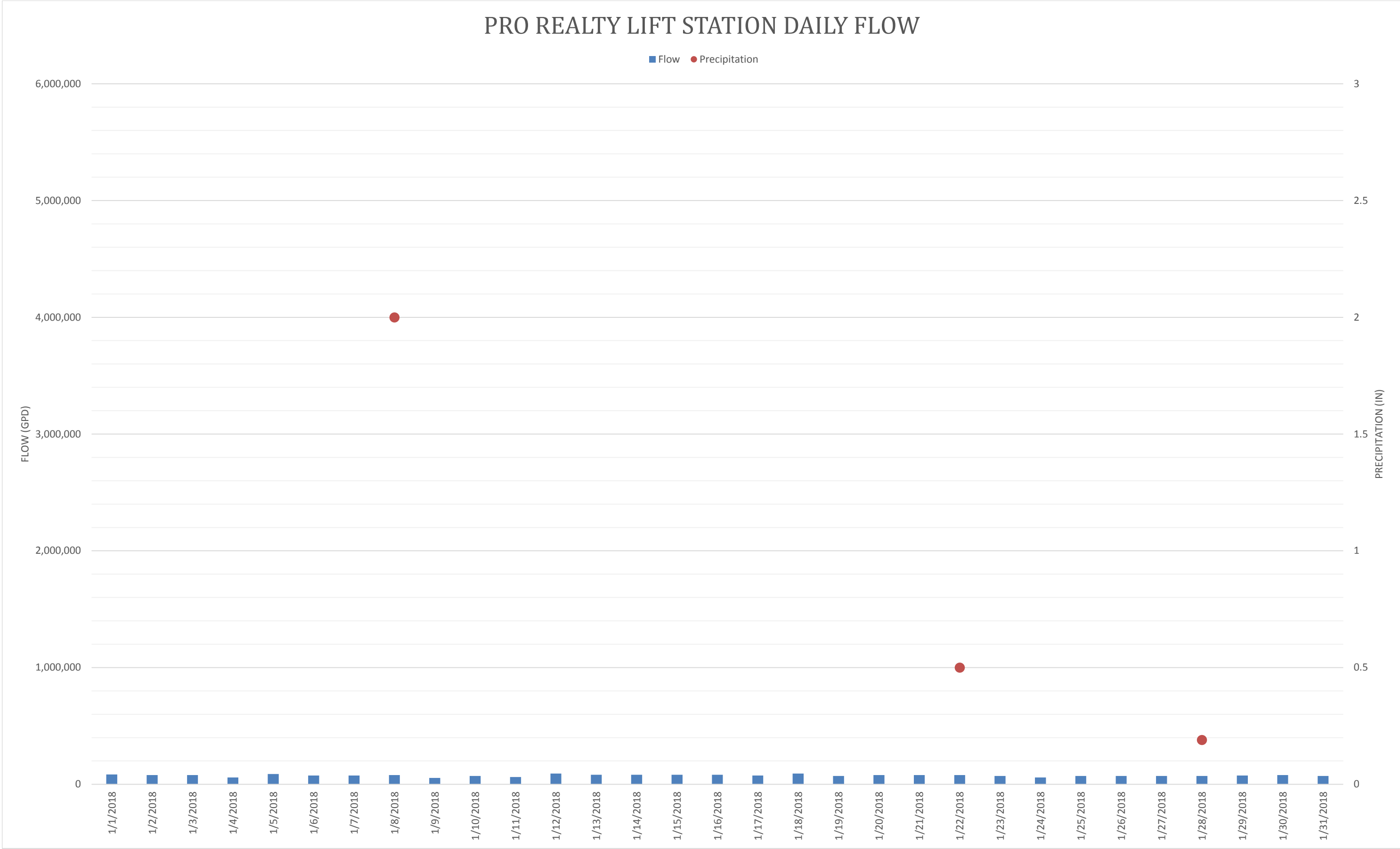


APPENDIX L
PRO REALTY LIFT STATION FLOW DATA

DRAFT

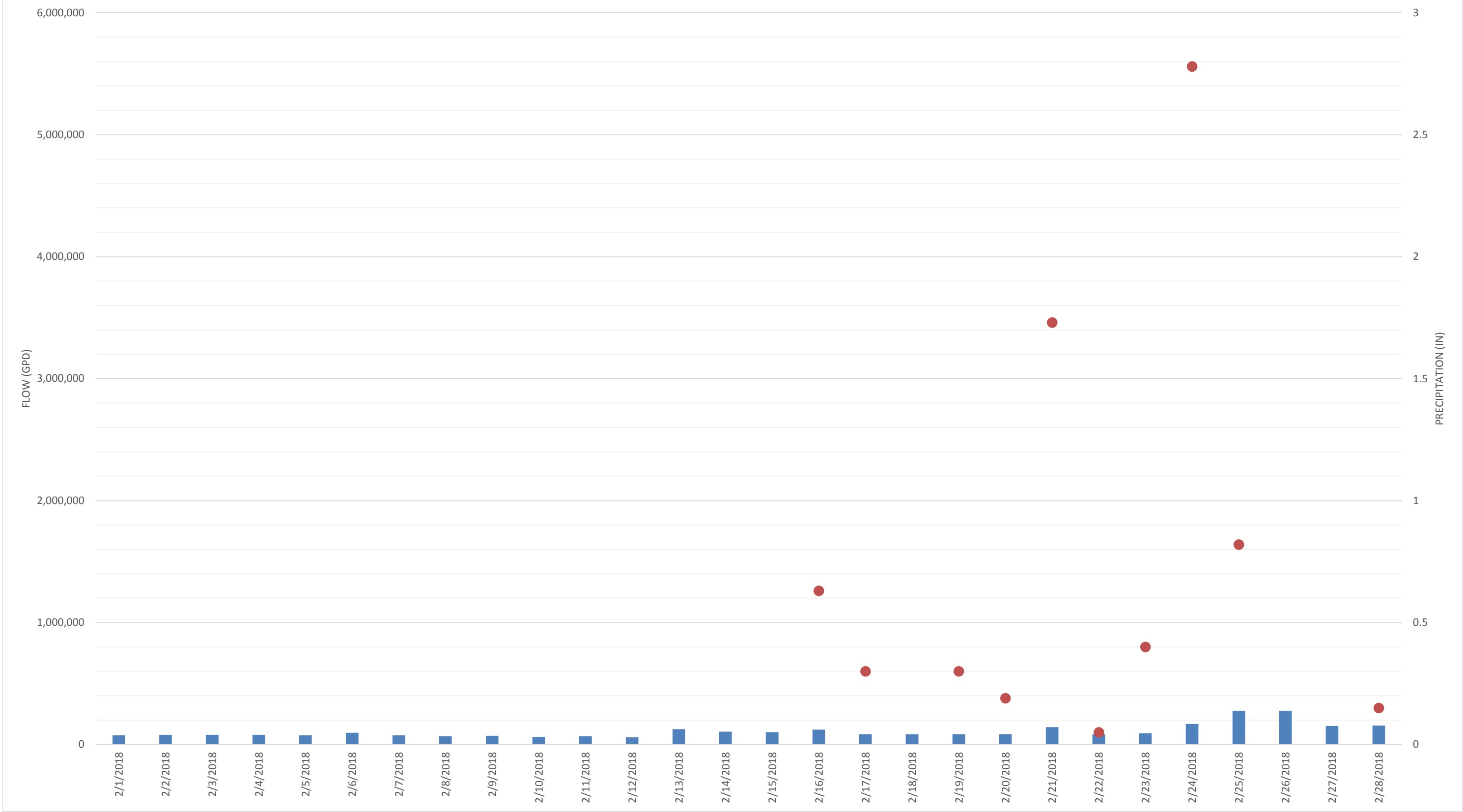
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



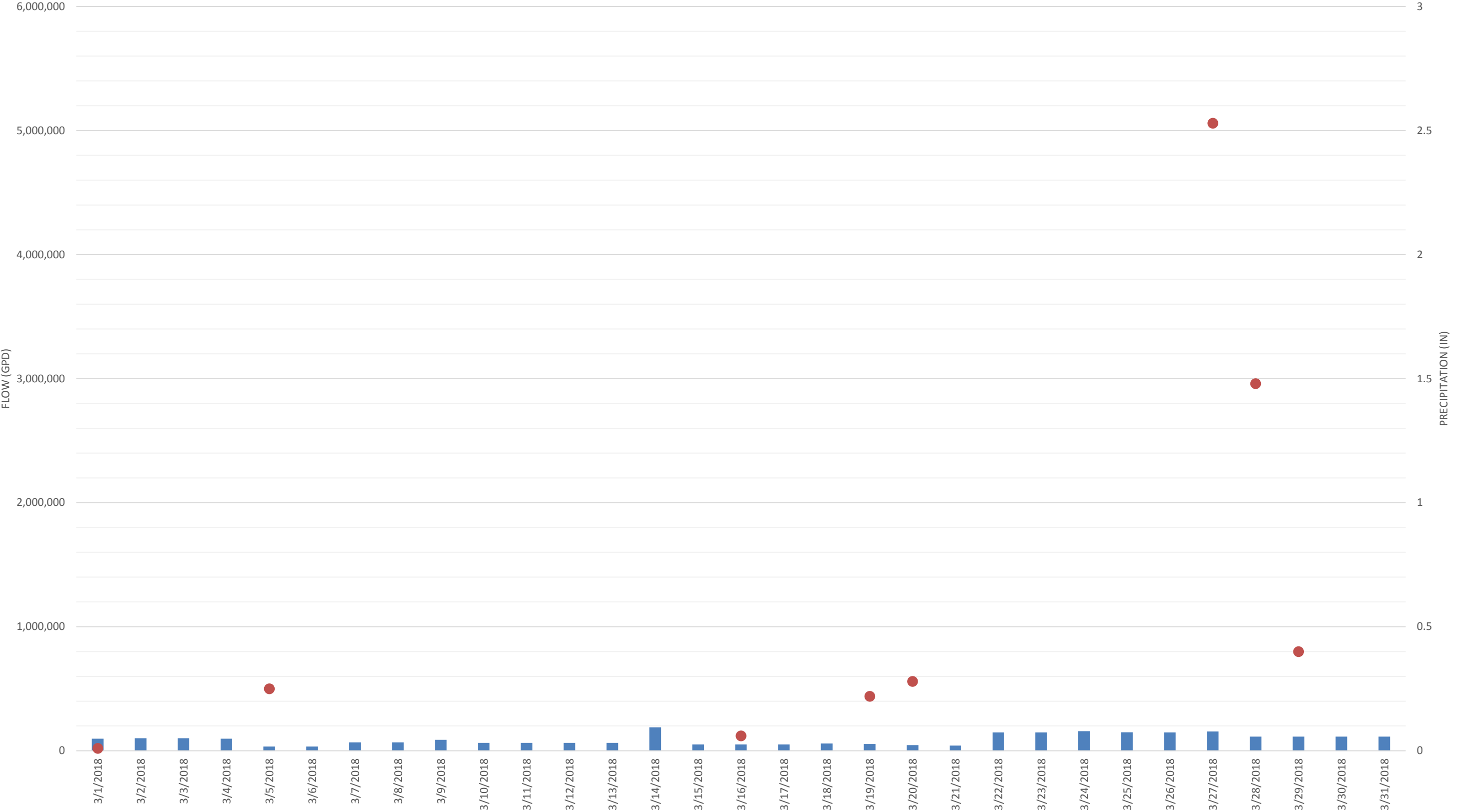
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



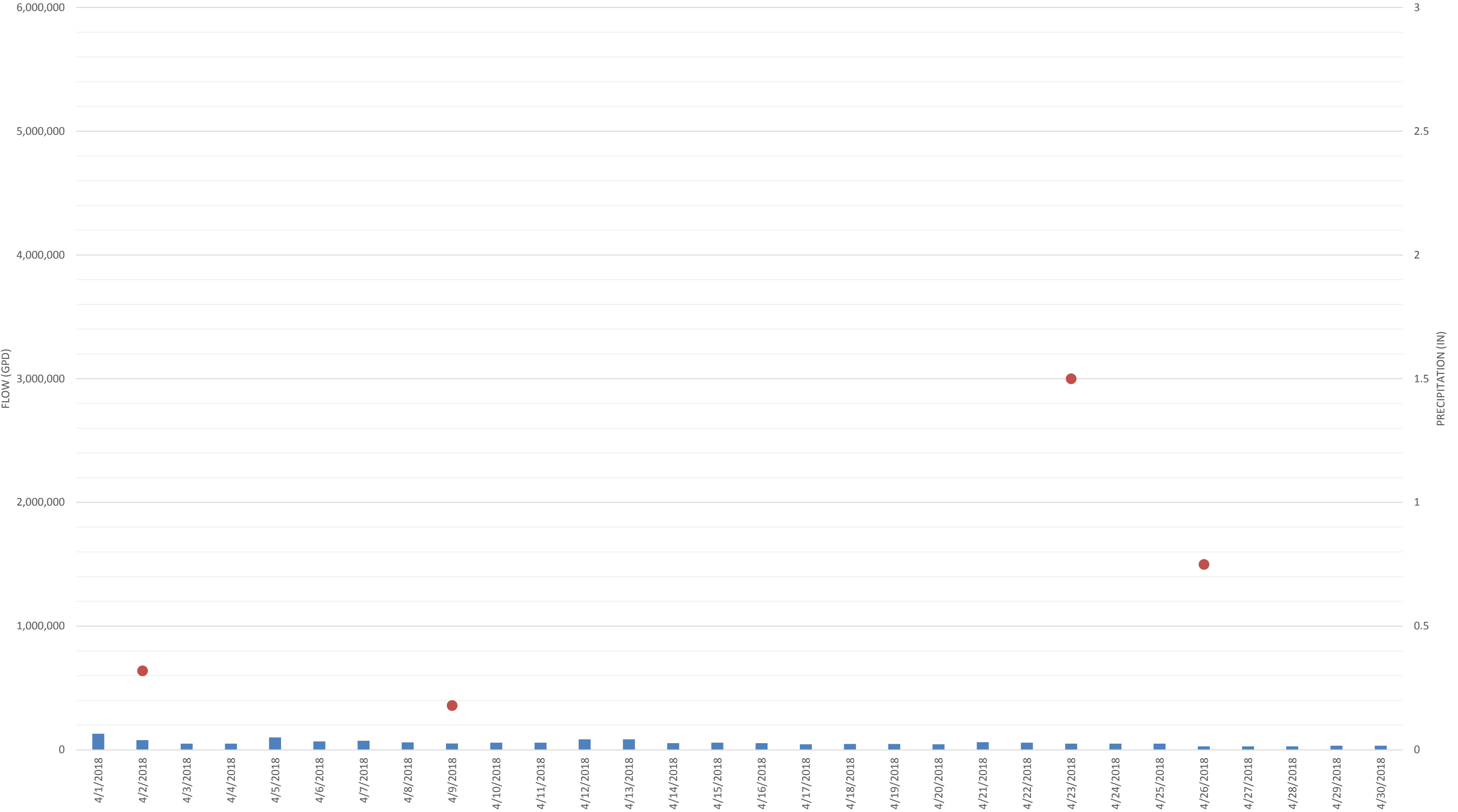
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



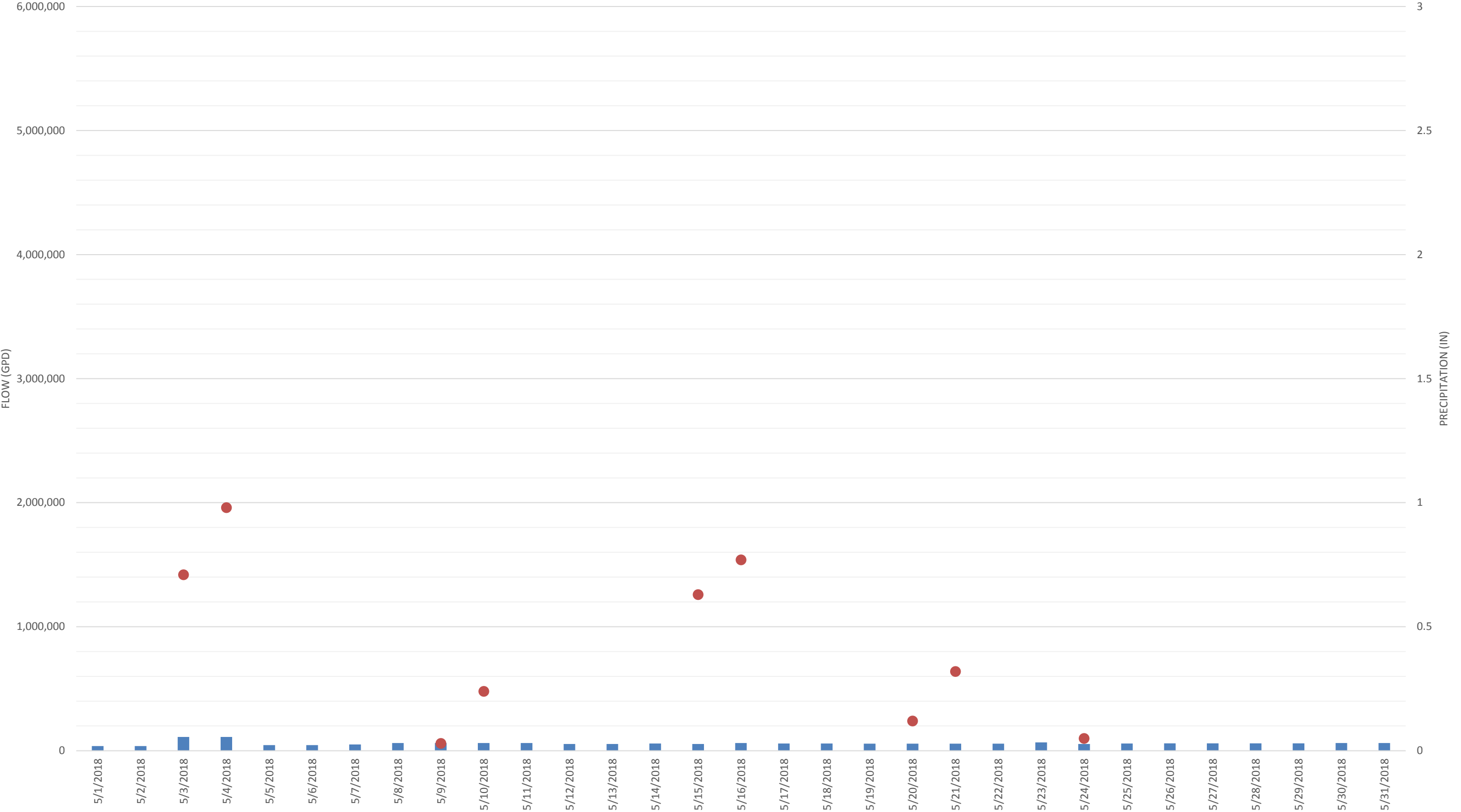
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



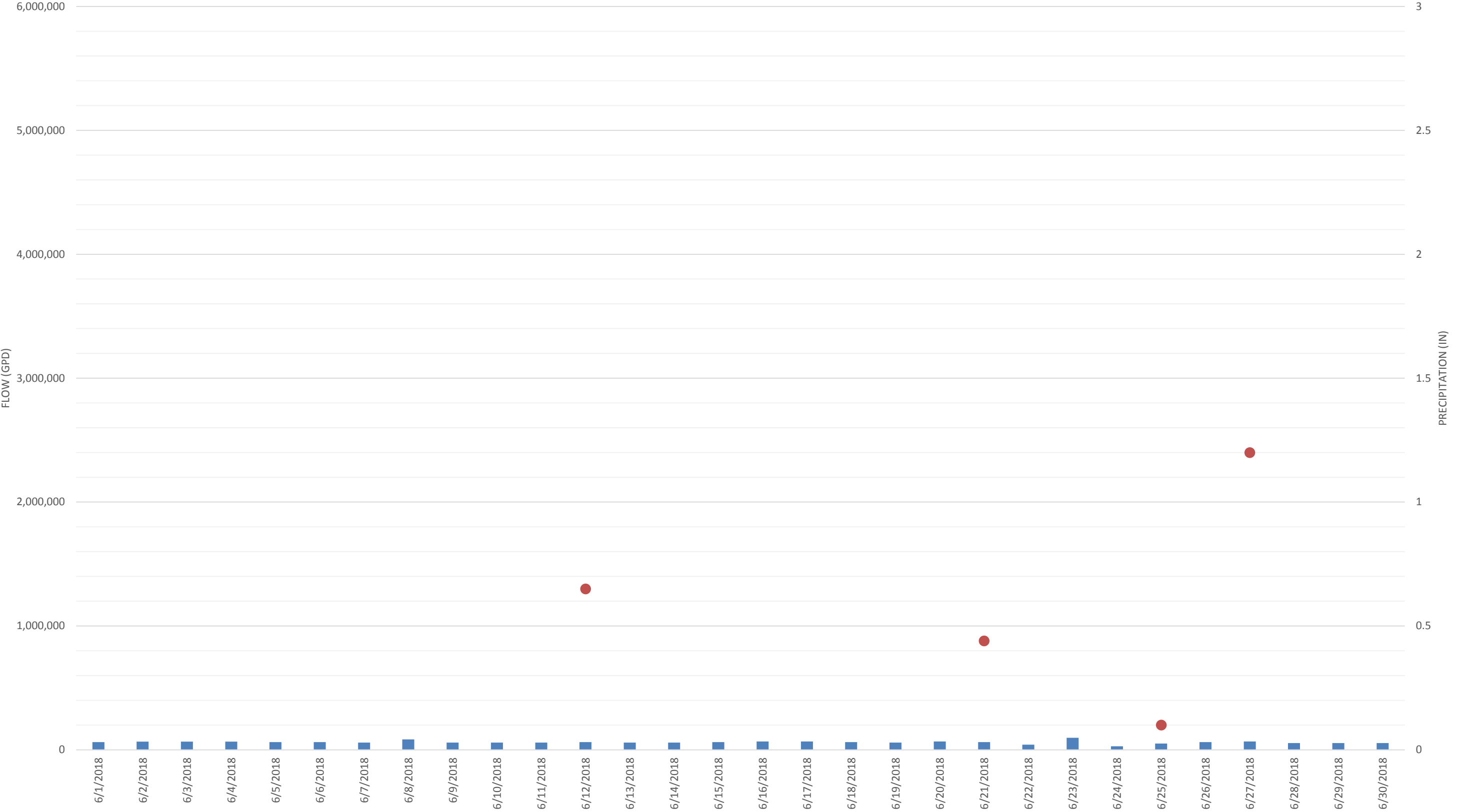
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



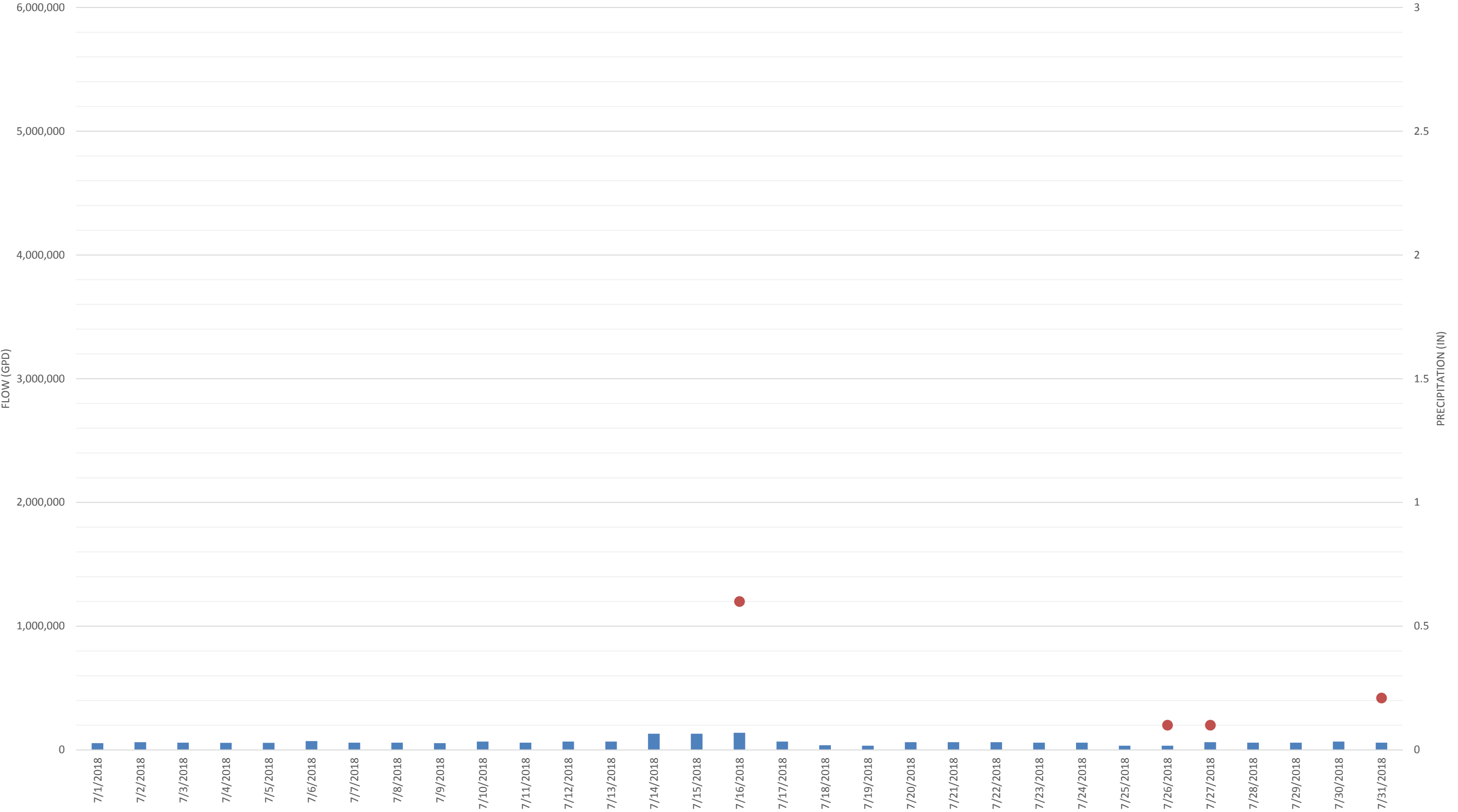
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



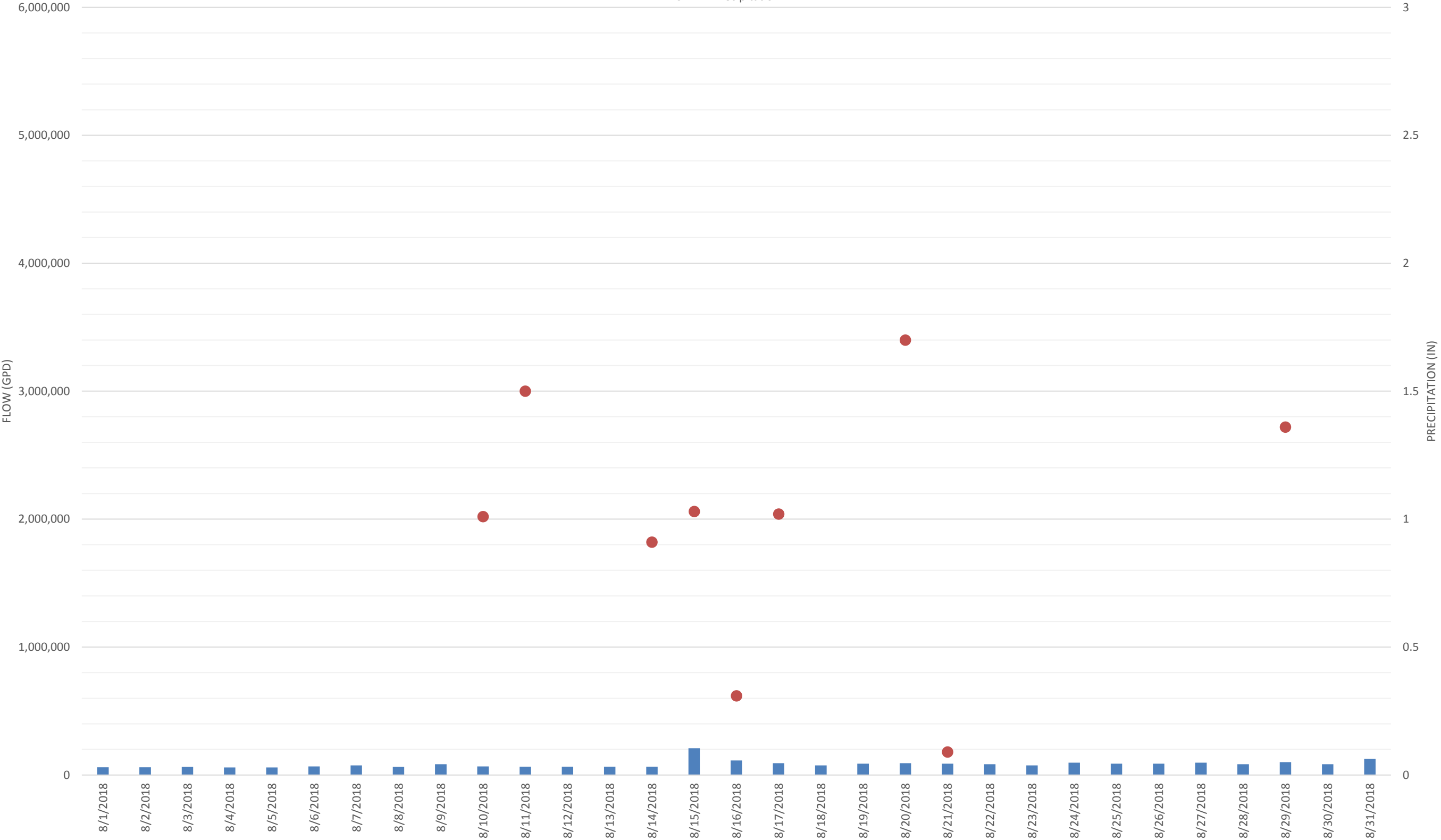
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



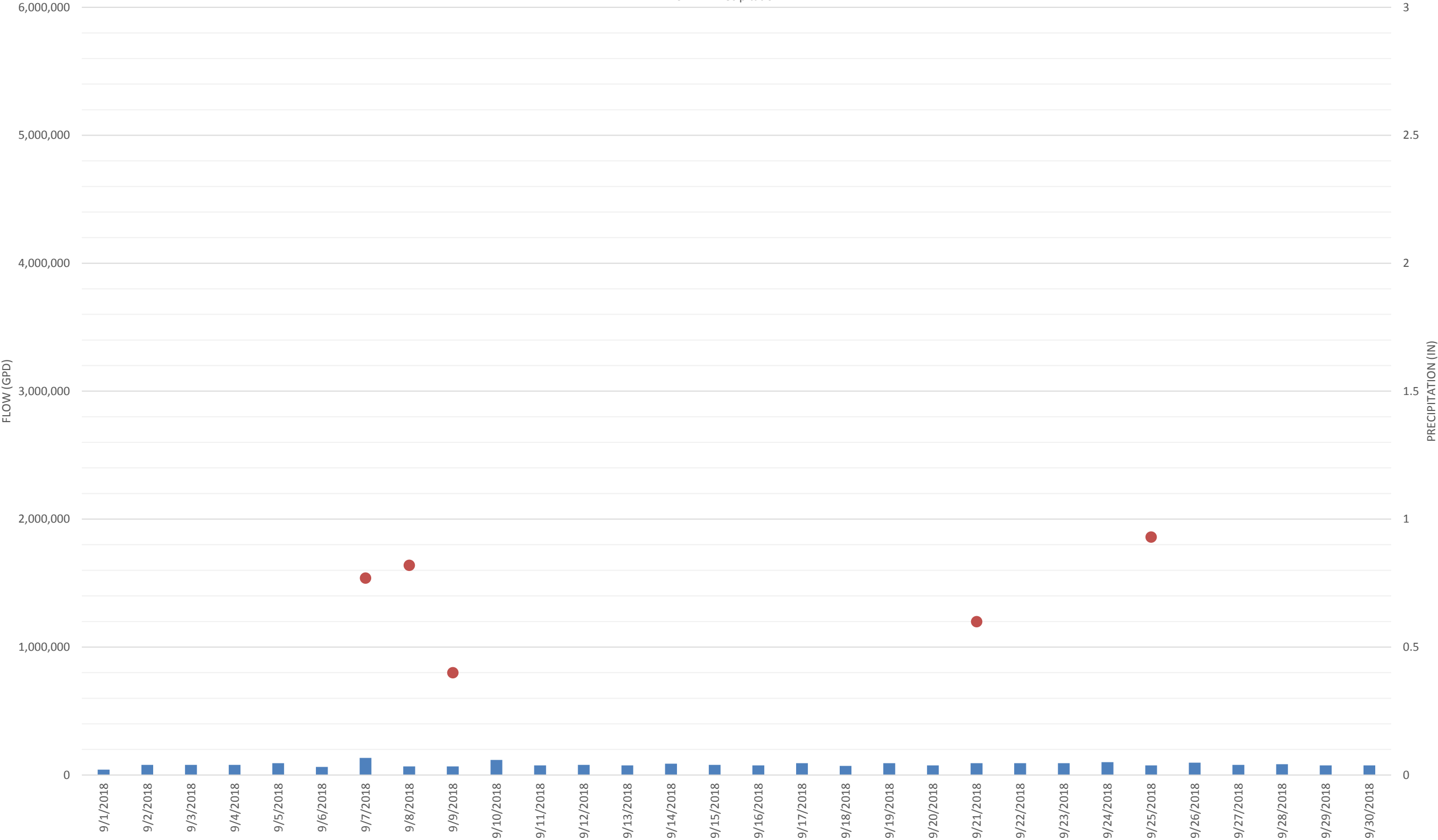
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



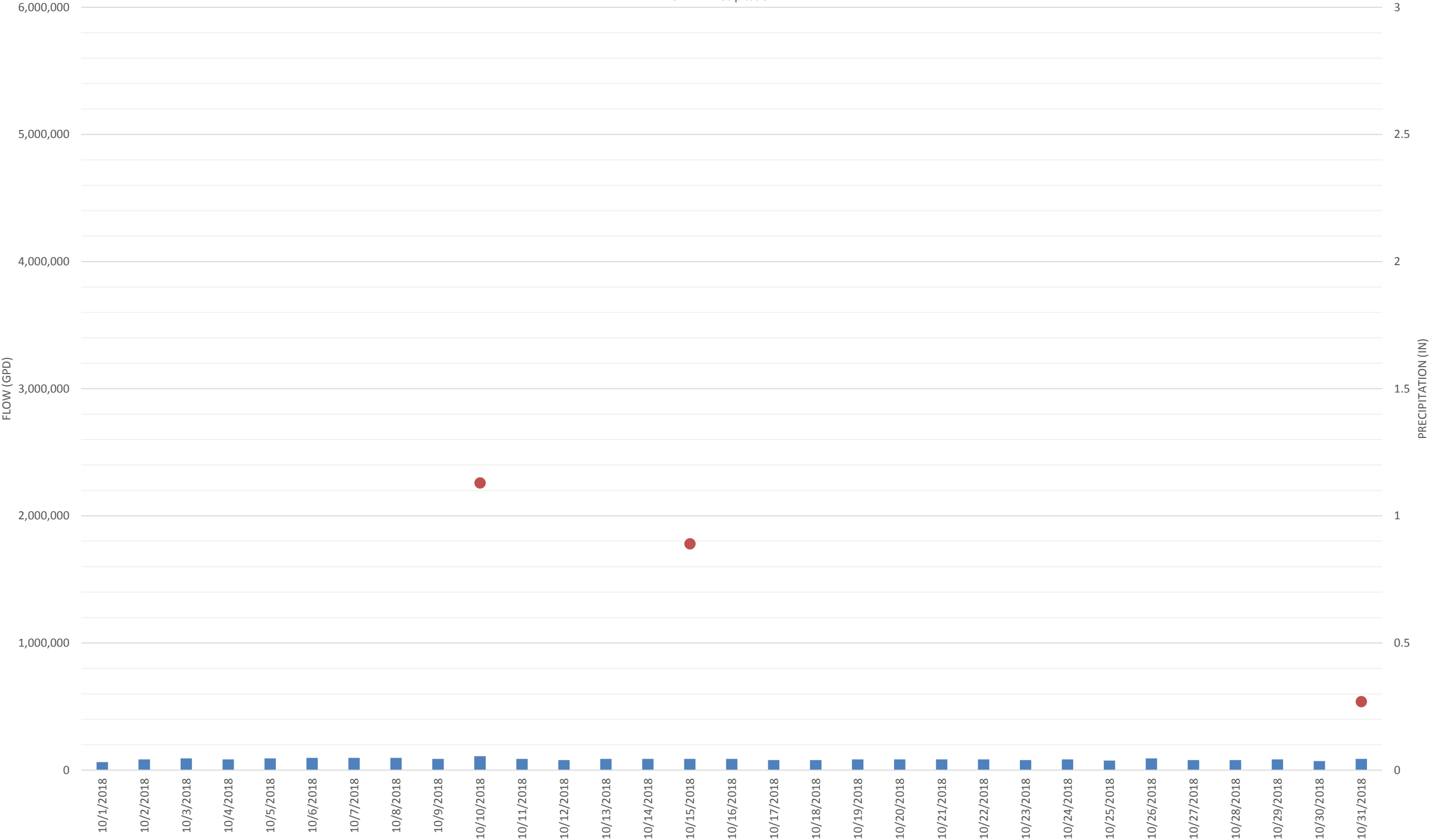
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



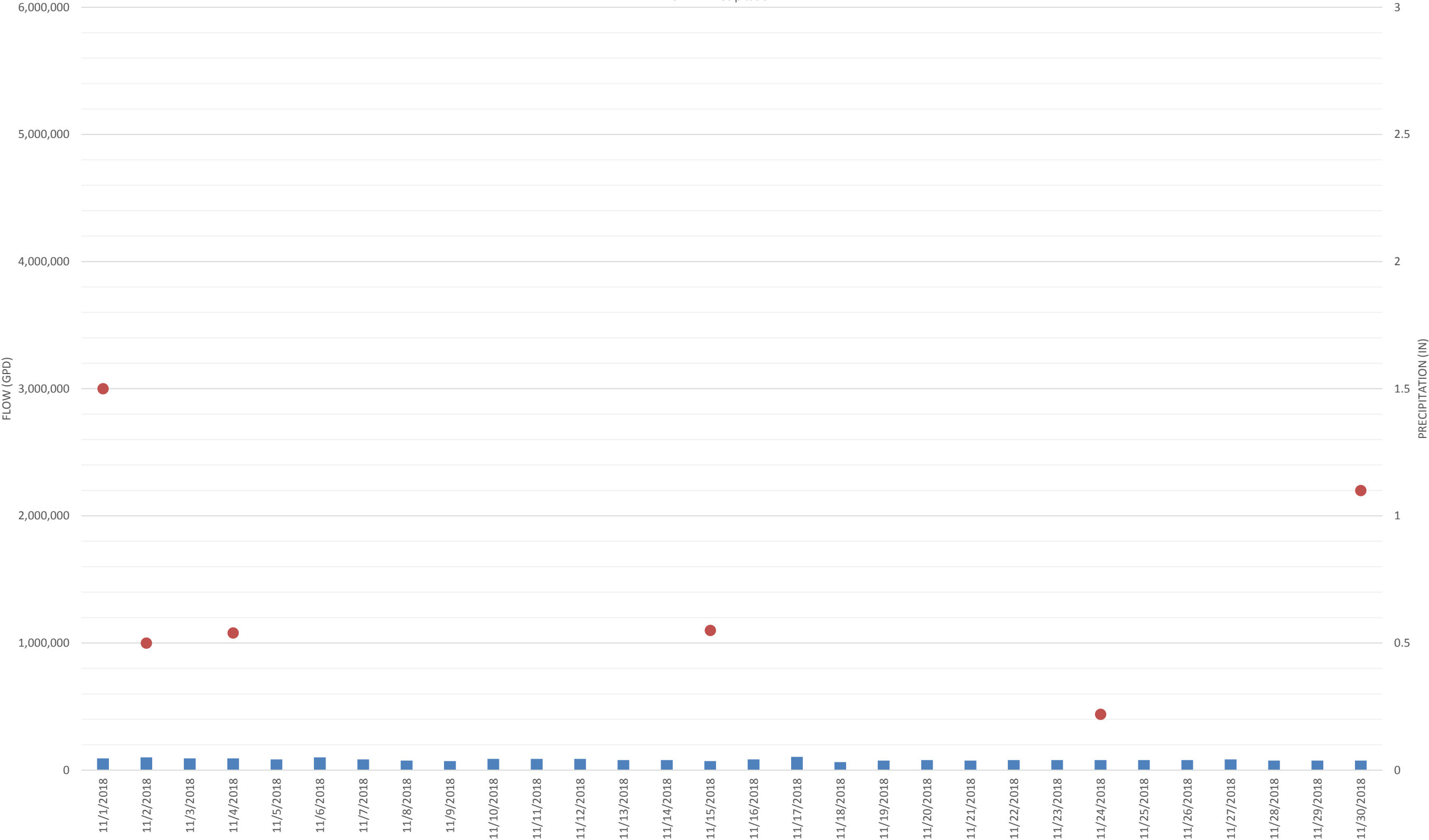
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



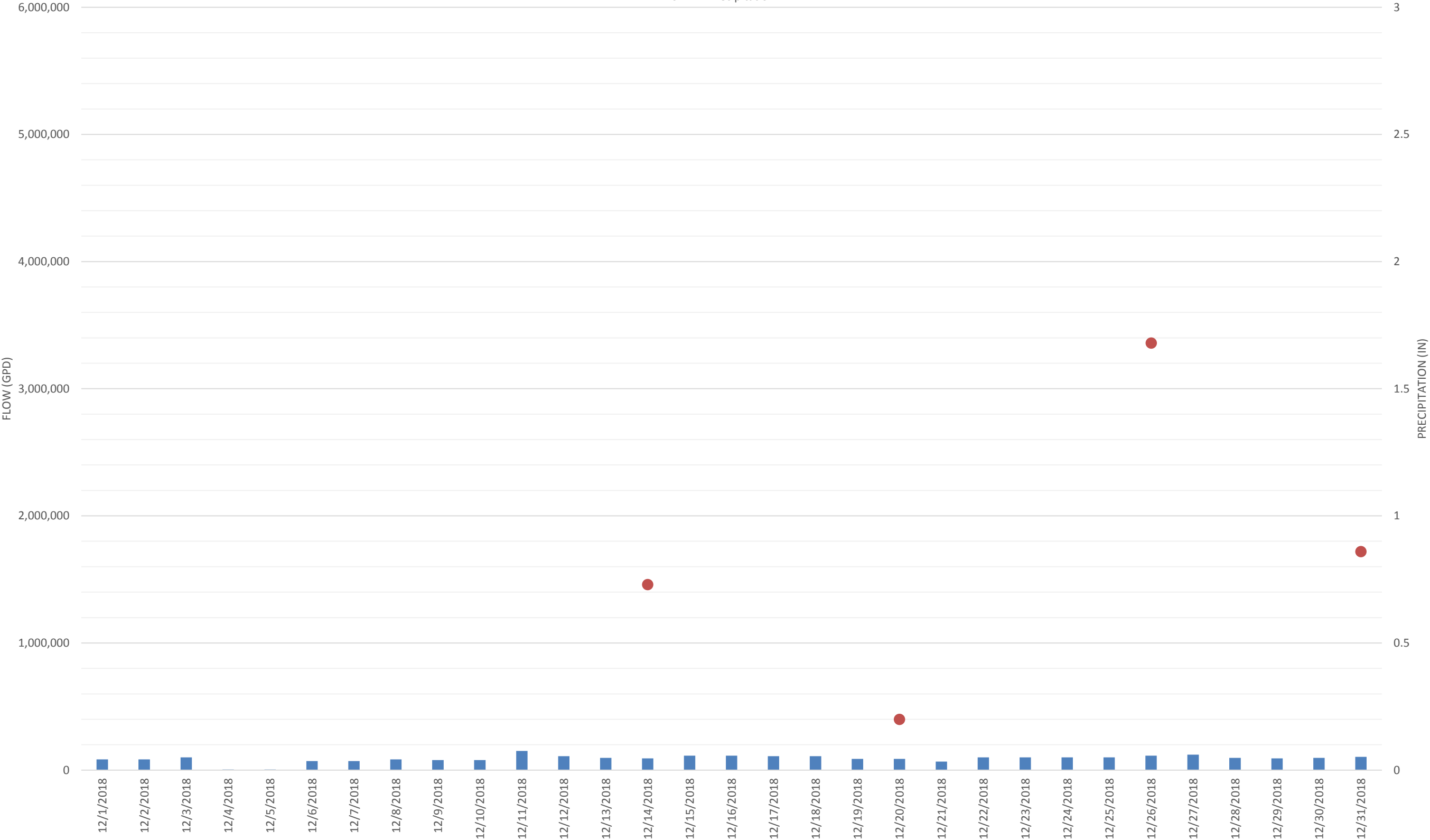
PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation



PRO REALTY LIFT STATION DAILY FLOW

Flow Precipitation

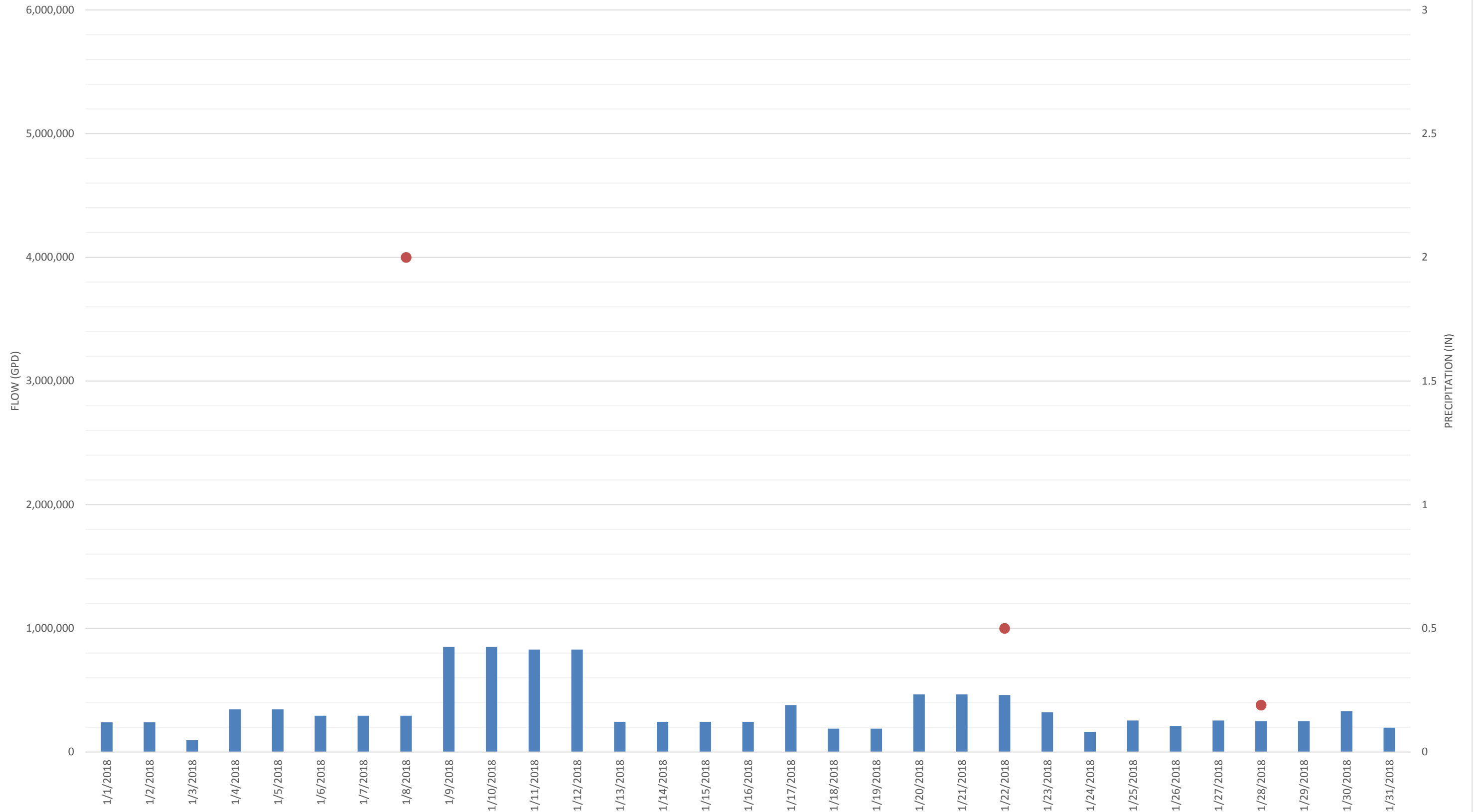


APPENDIX M
SHOP LIFT STATION FLOW DATA

DRAFT

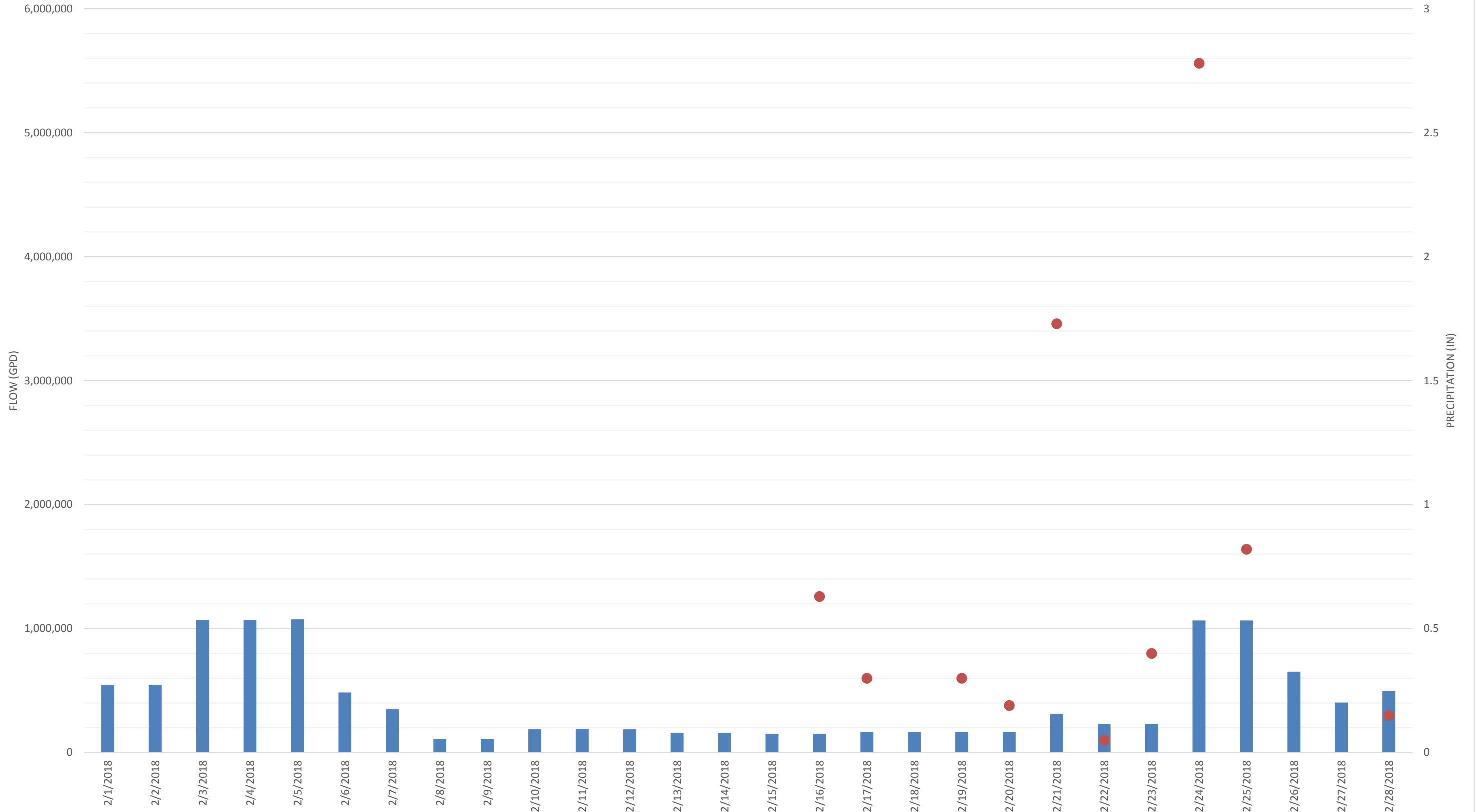
SHOP LIFT STATION DAILY FLOW

Flow Precipitation



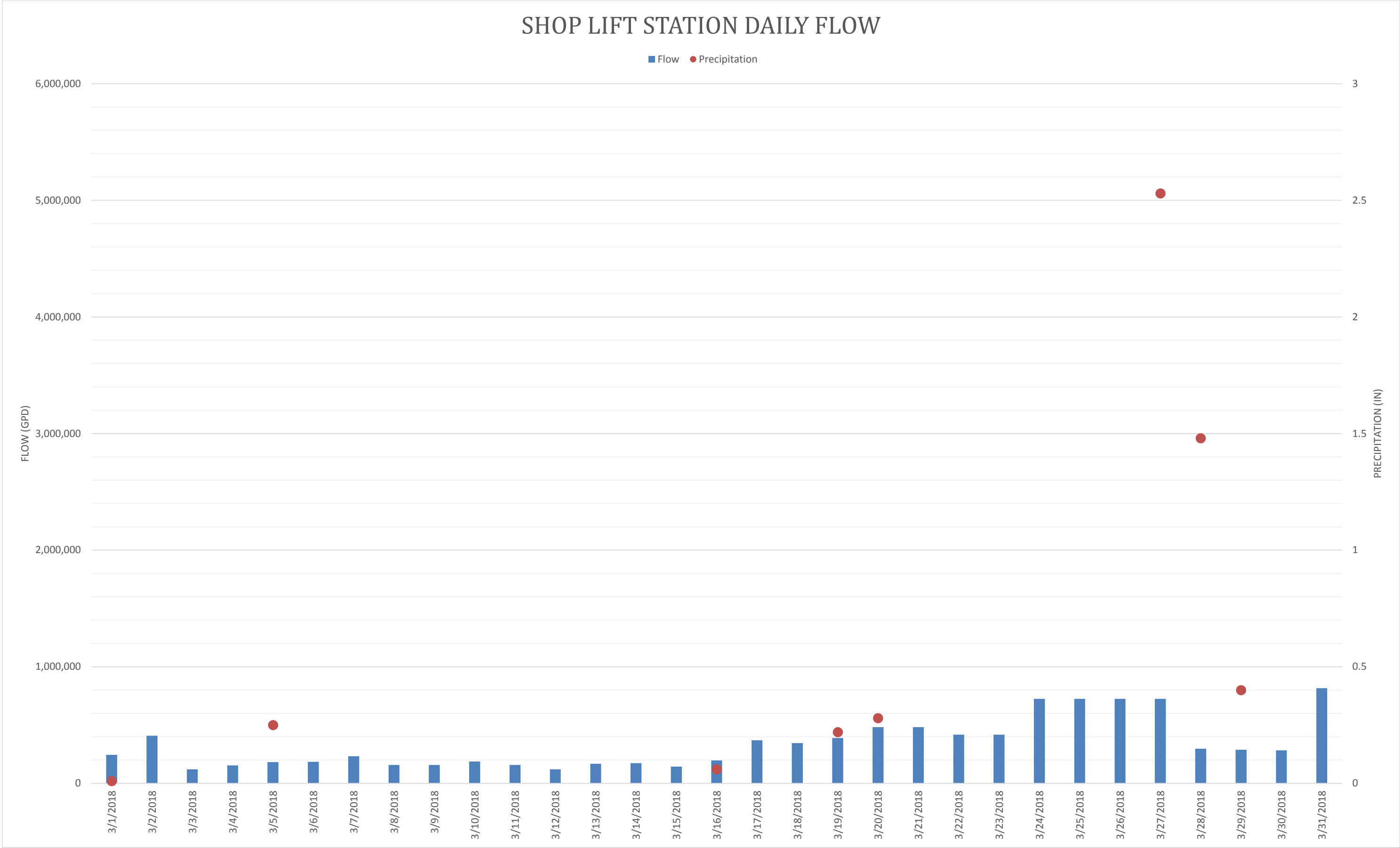
SHOP LIFT STATION DAILY FLOW

■ Flow ● Precipitation



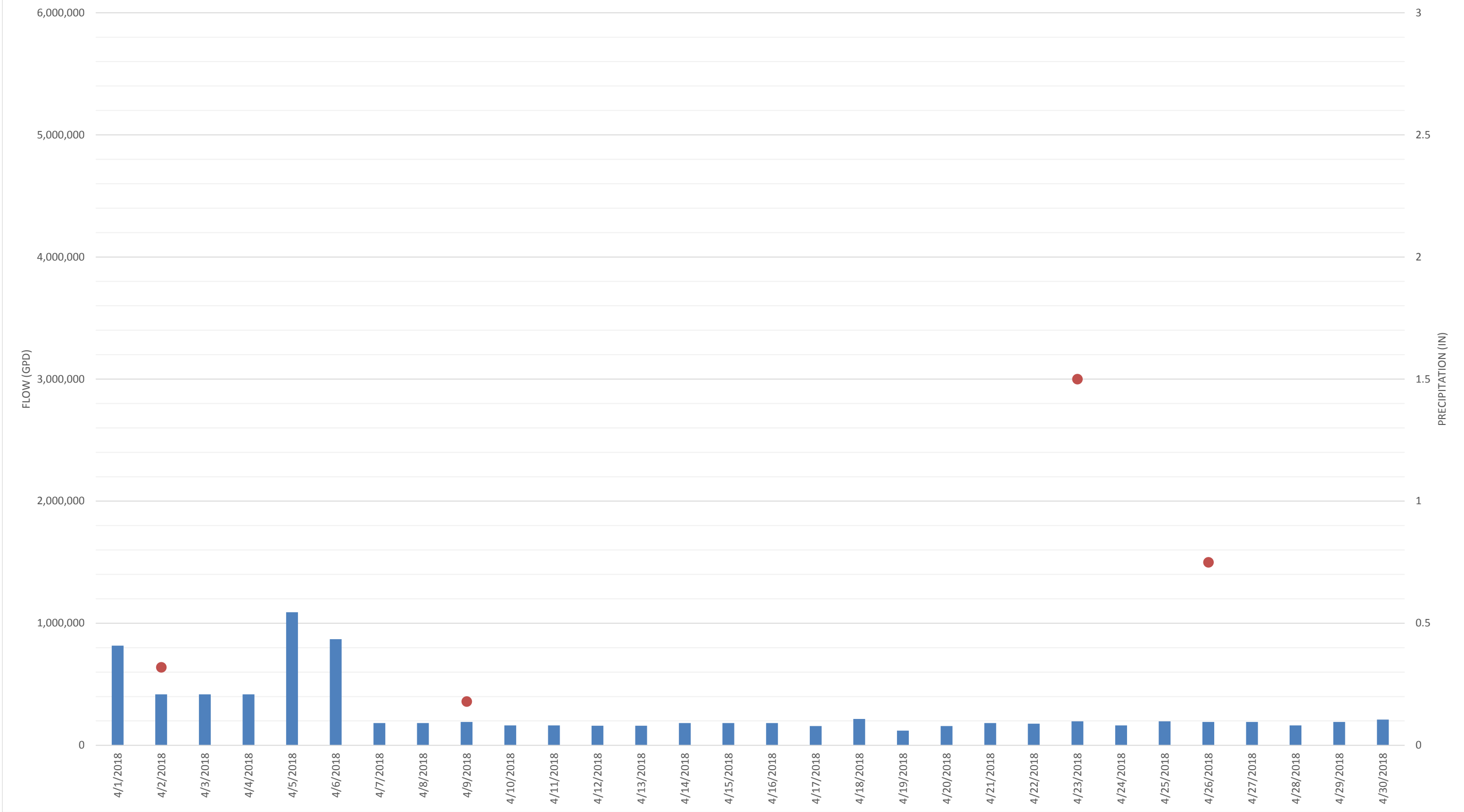
SHOP LIFT STATION DAILY FLOW

Flow Precipitation



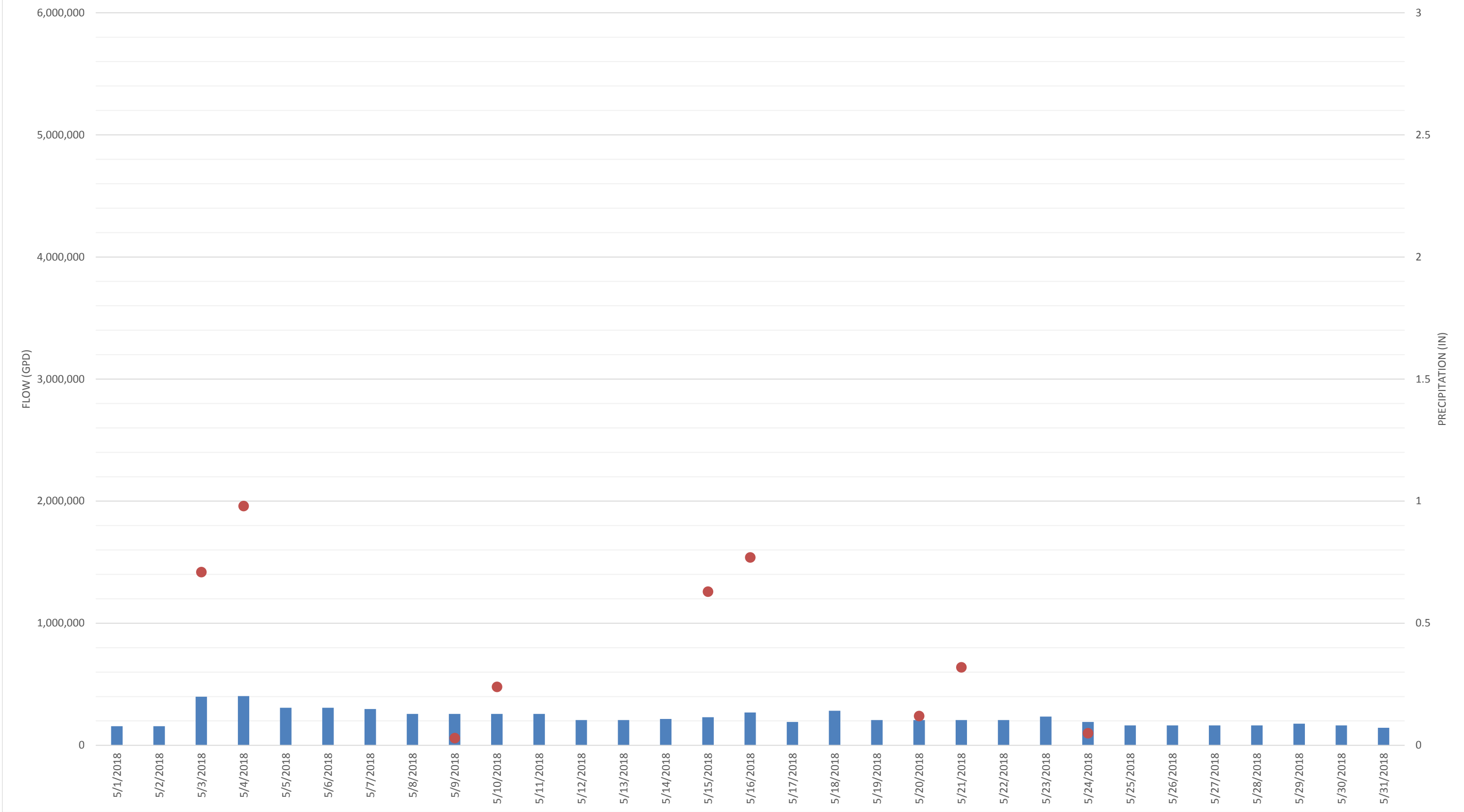
SHOP LIFT STATION DAILY FLOW

■ Flow ● Precipitation



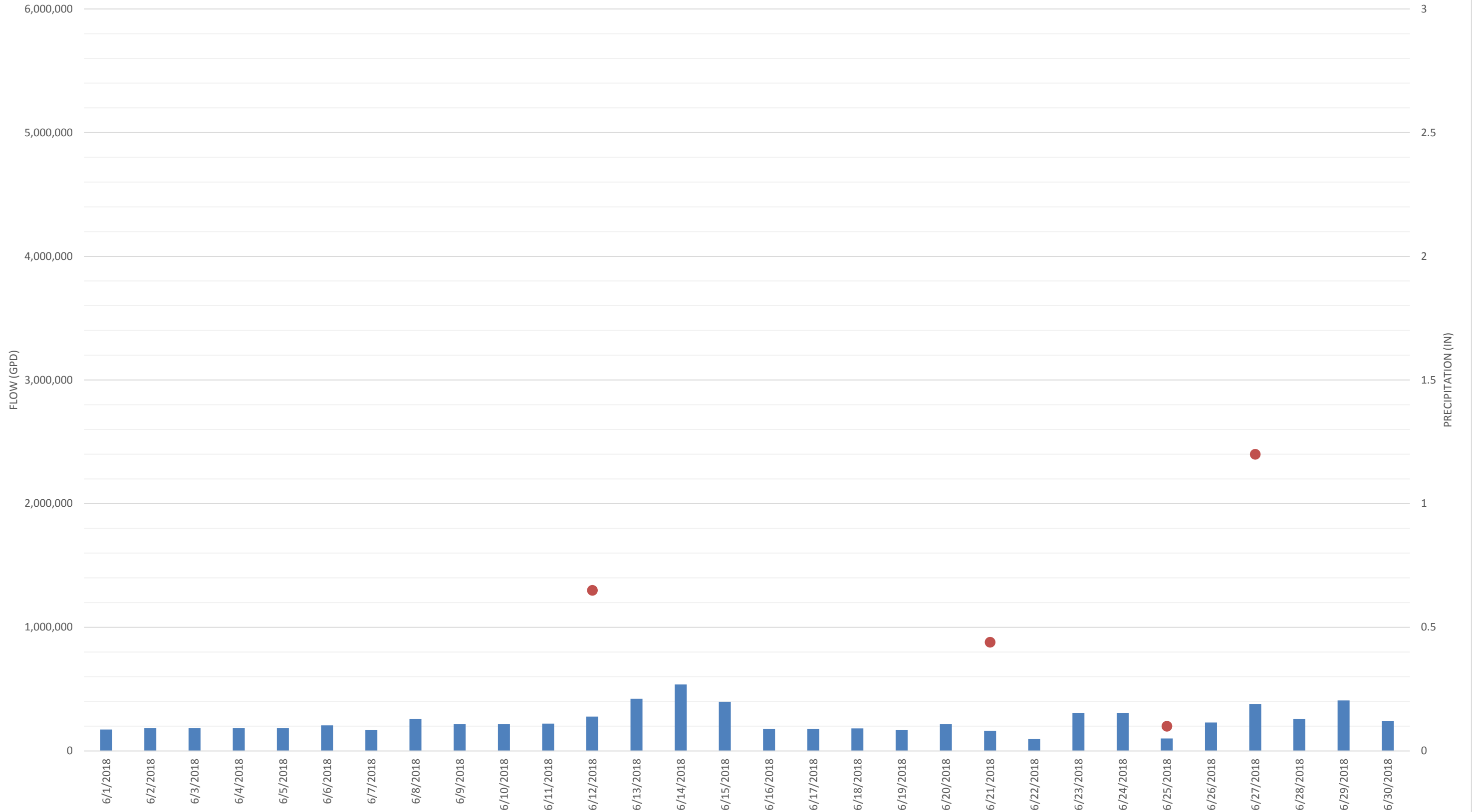
SHOP LIFT STATION DAILY FLOW

Flow Precipitation



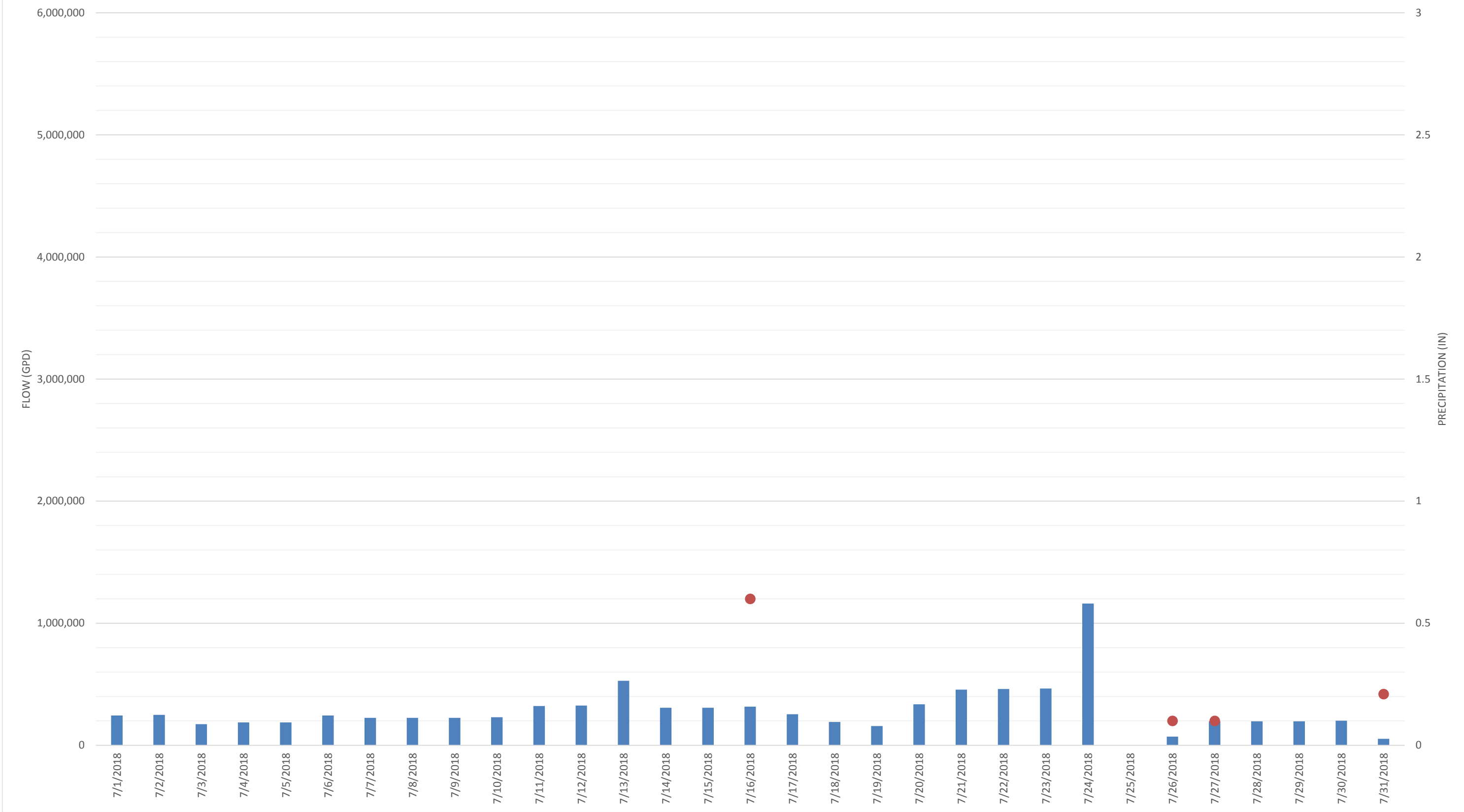
SHOP LIFT STATION DAILY FLOW

■ Flow ● Precipitation

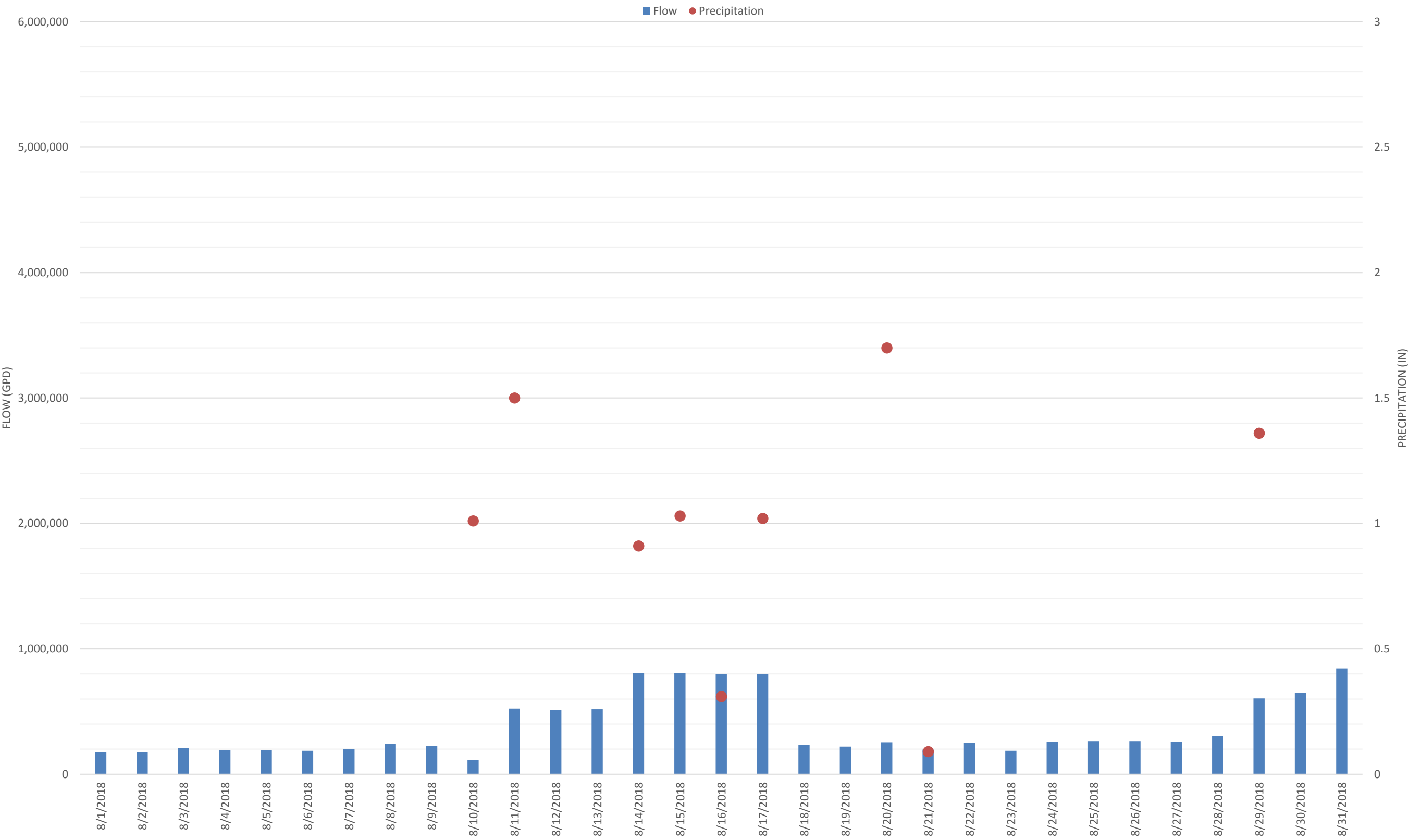


SHOP LIFT STATION DAILY FLOW

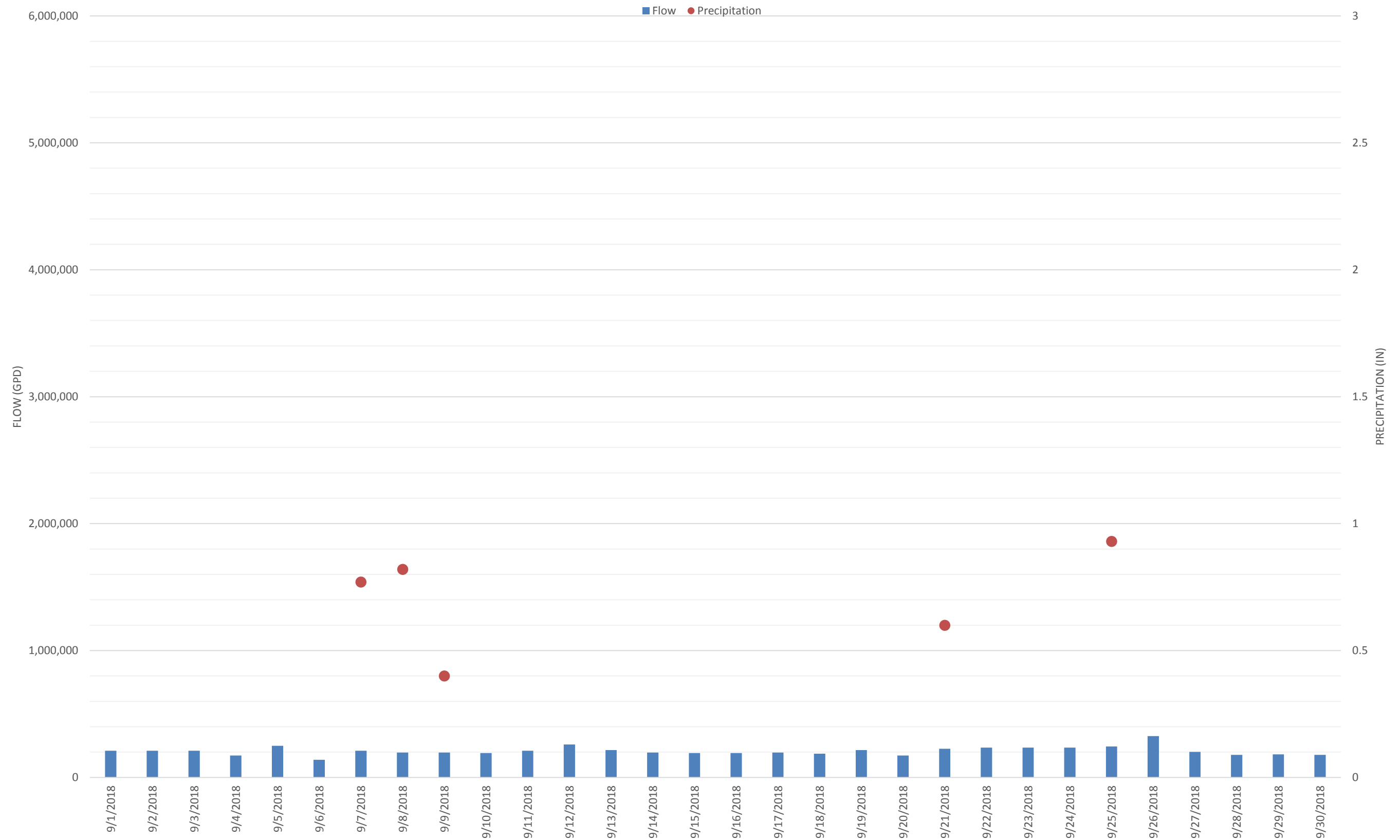
Flow Precipitation



SHOP LIFT STATION DAILY FLOW

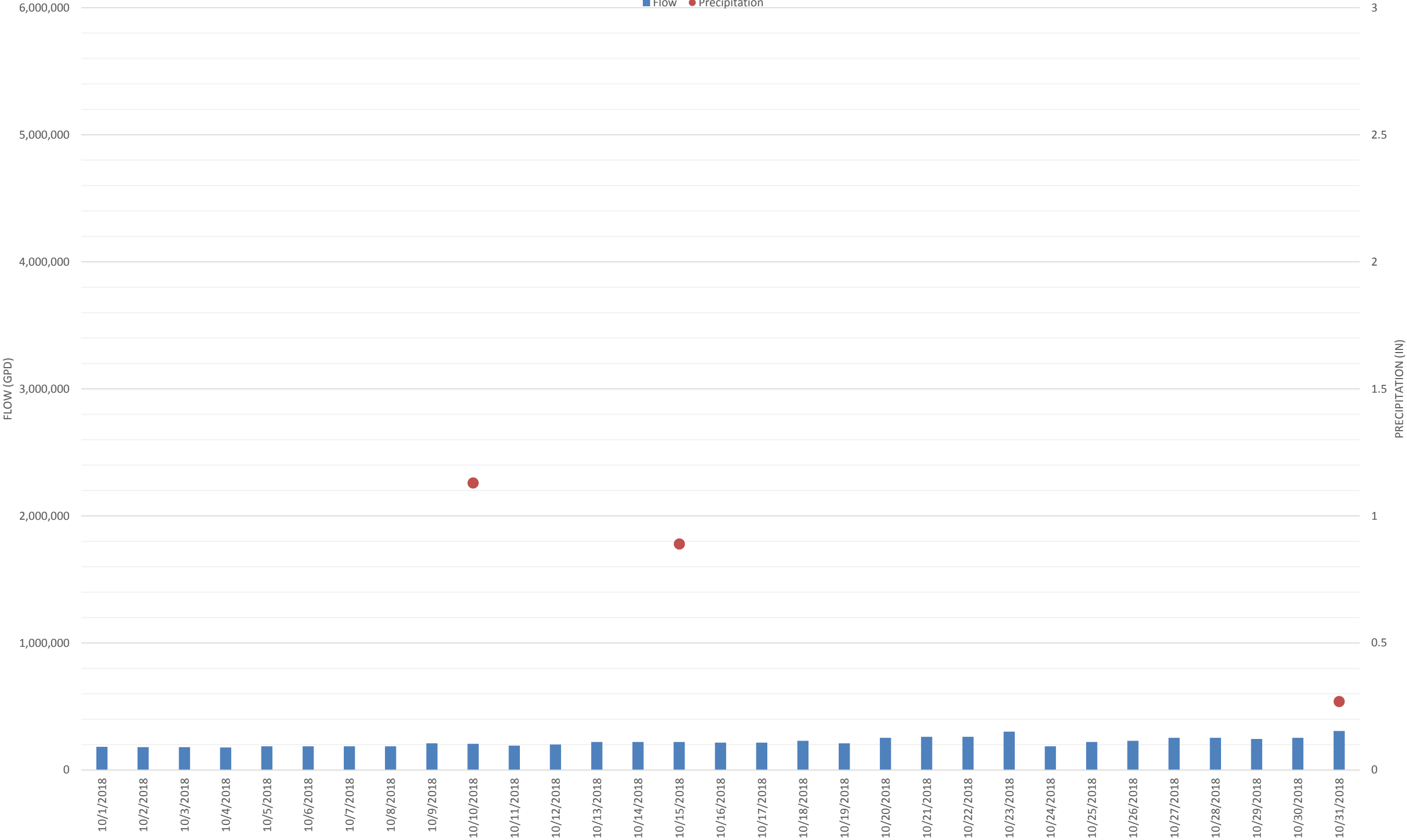


SHOP LIFT STATION DAILY FLOW

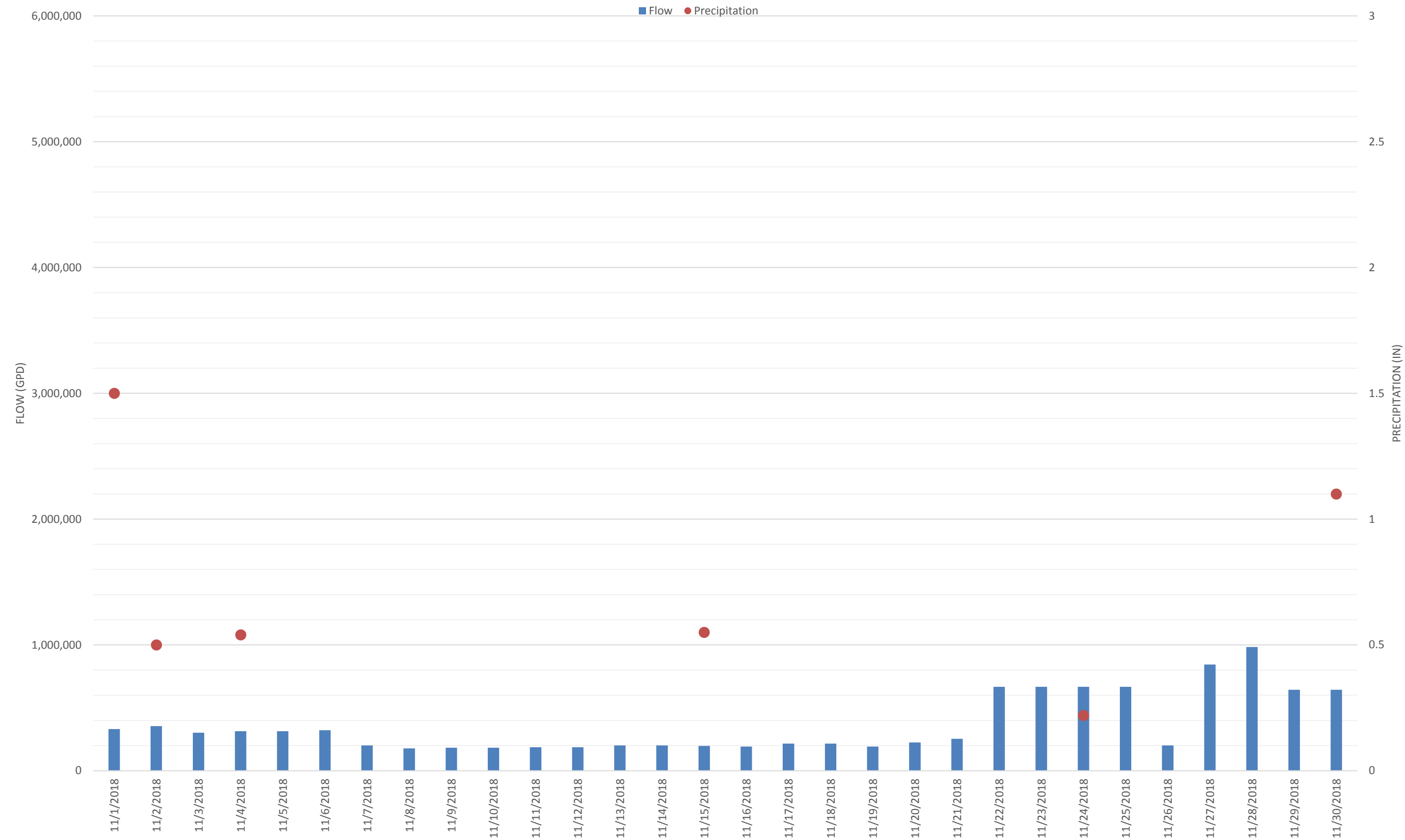


SHOP LIFT STATION DAILY FLOW

Flow Precipitation

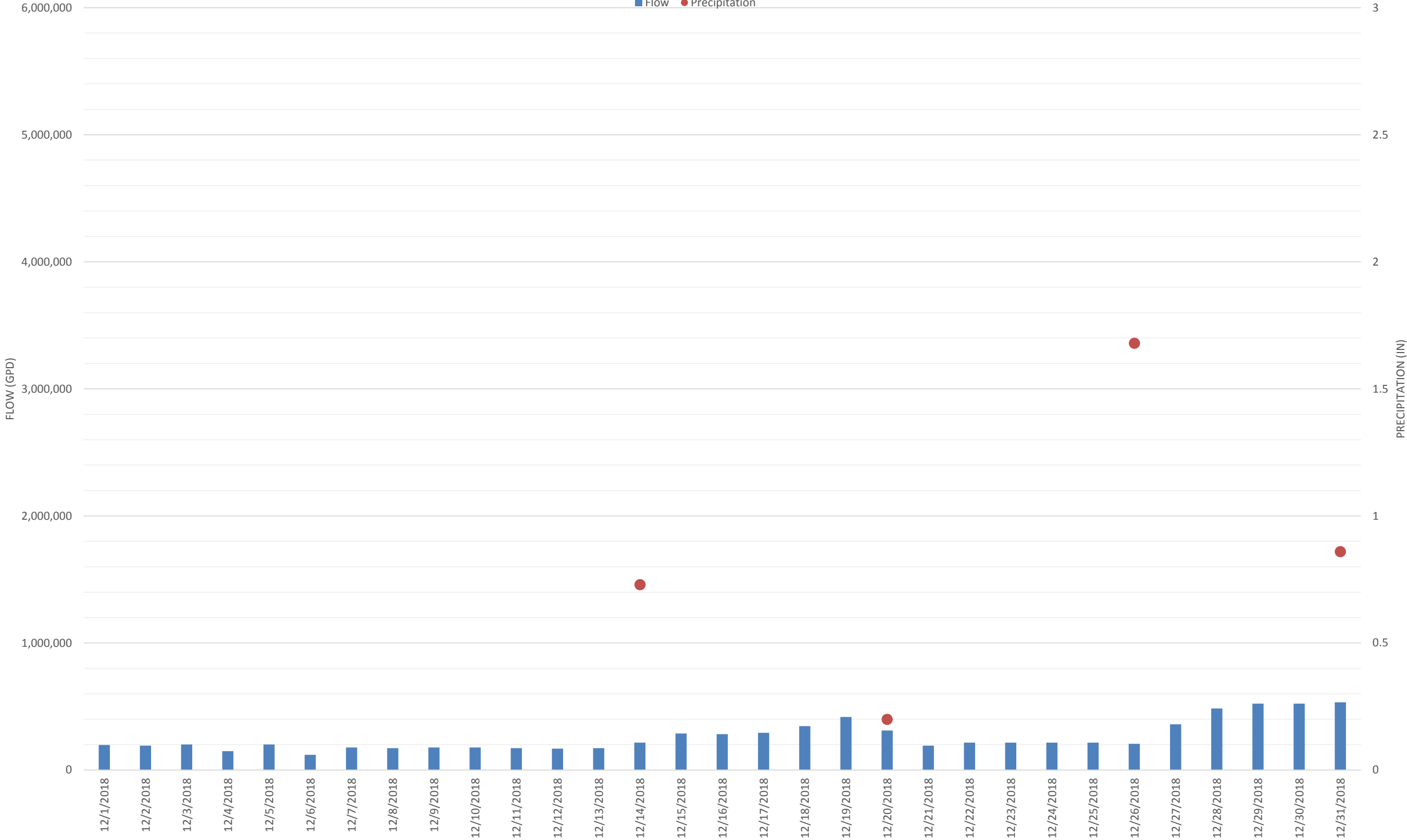


SHOP LIFT STATION DAILY FLOW



SHOP LIFT STATION DAILY FLOW

Flow Precipitation

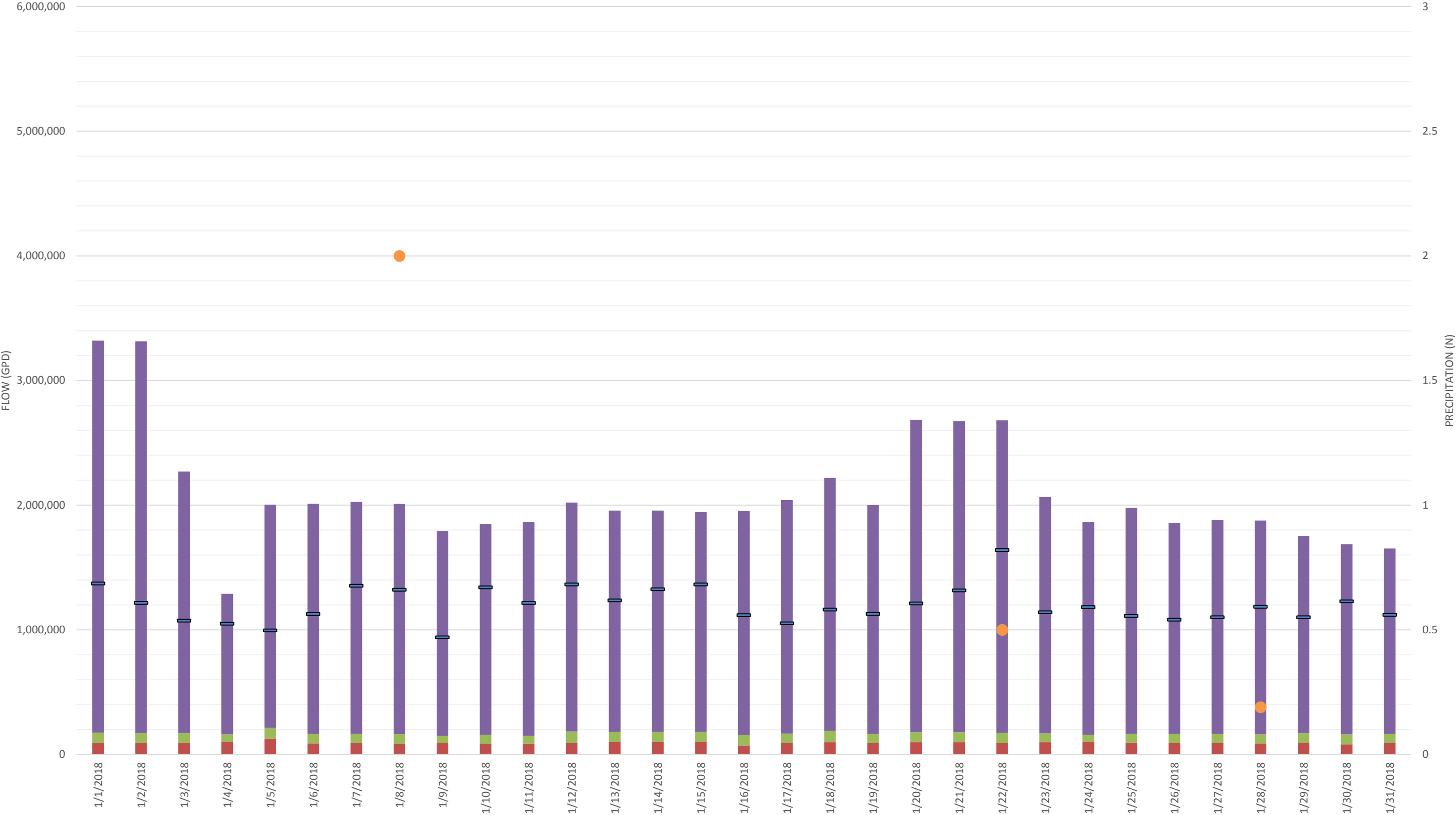


APPENDIX N
NORTH 22ND STREET WWTP COMBINED FLOW DATA

DRAFT

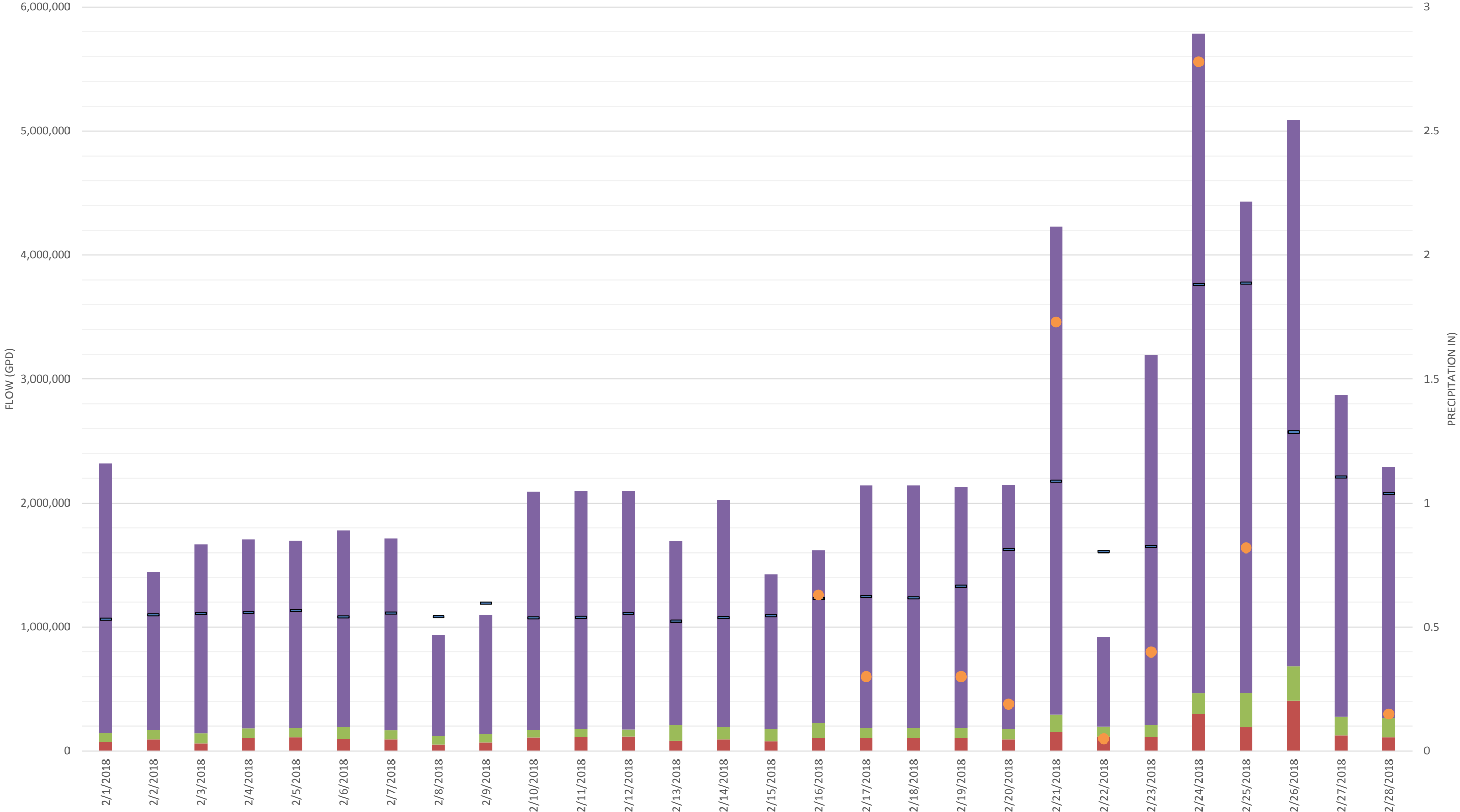
Daily Flow to North Wastewater Treatment Plant

OTC PRO REALTY FASCO NORTH PLANT PRECIPITATION



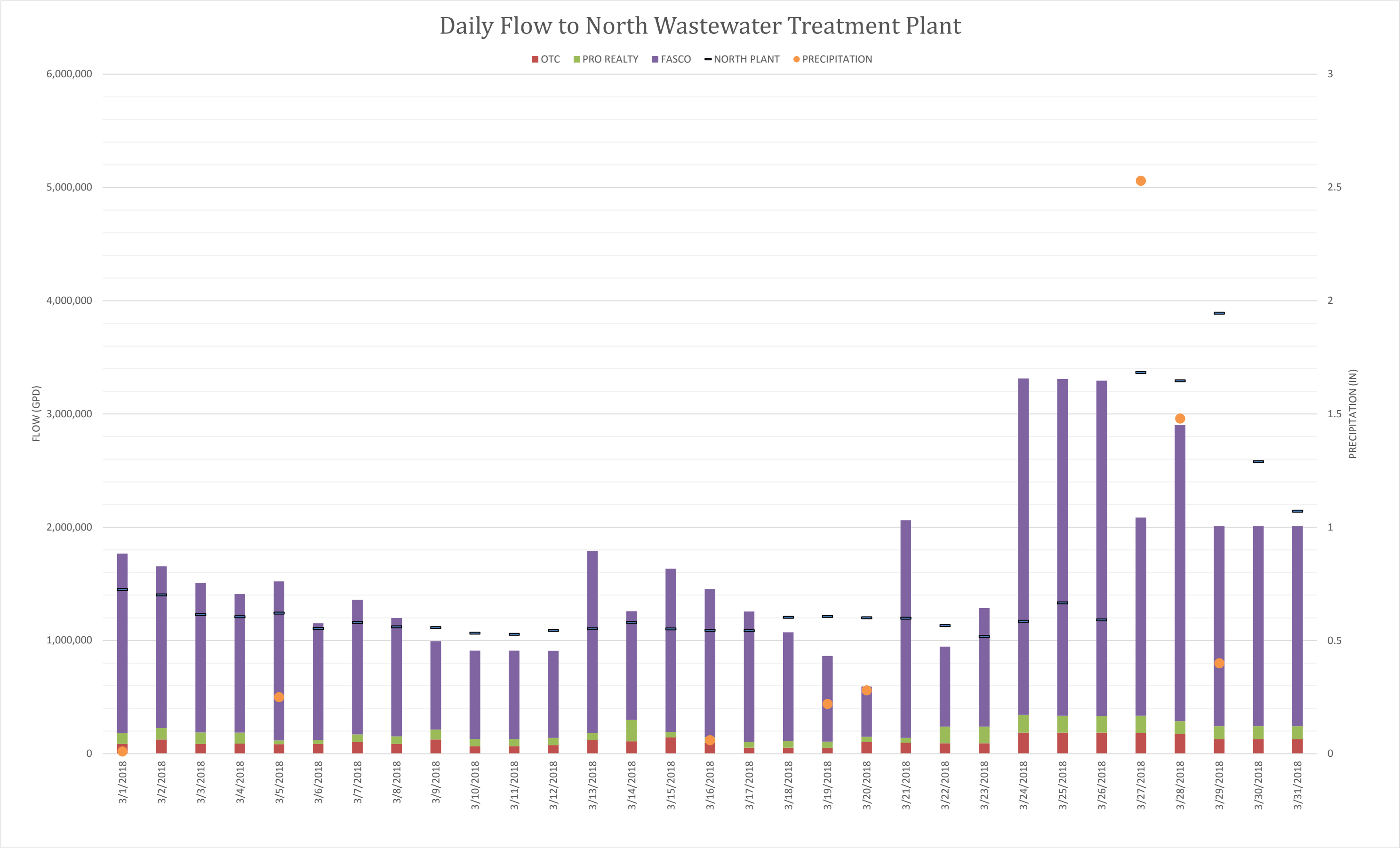
Daily Flow to North Wastewater Treatment Plant

OTC PRO REALTY FASCO NORTH PLANT PRECIPITATION



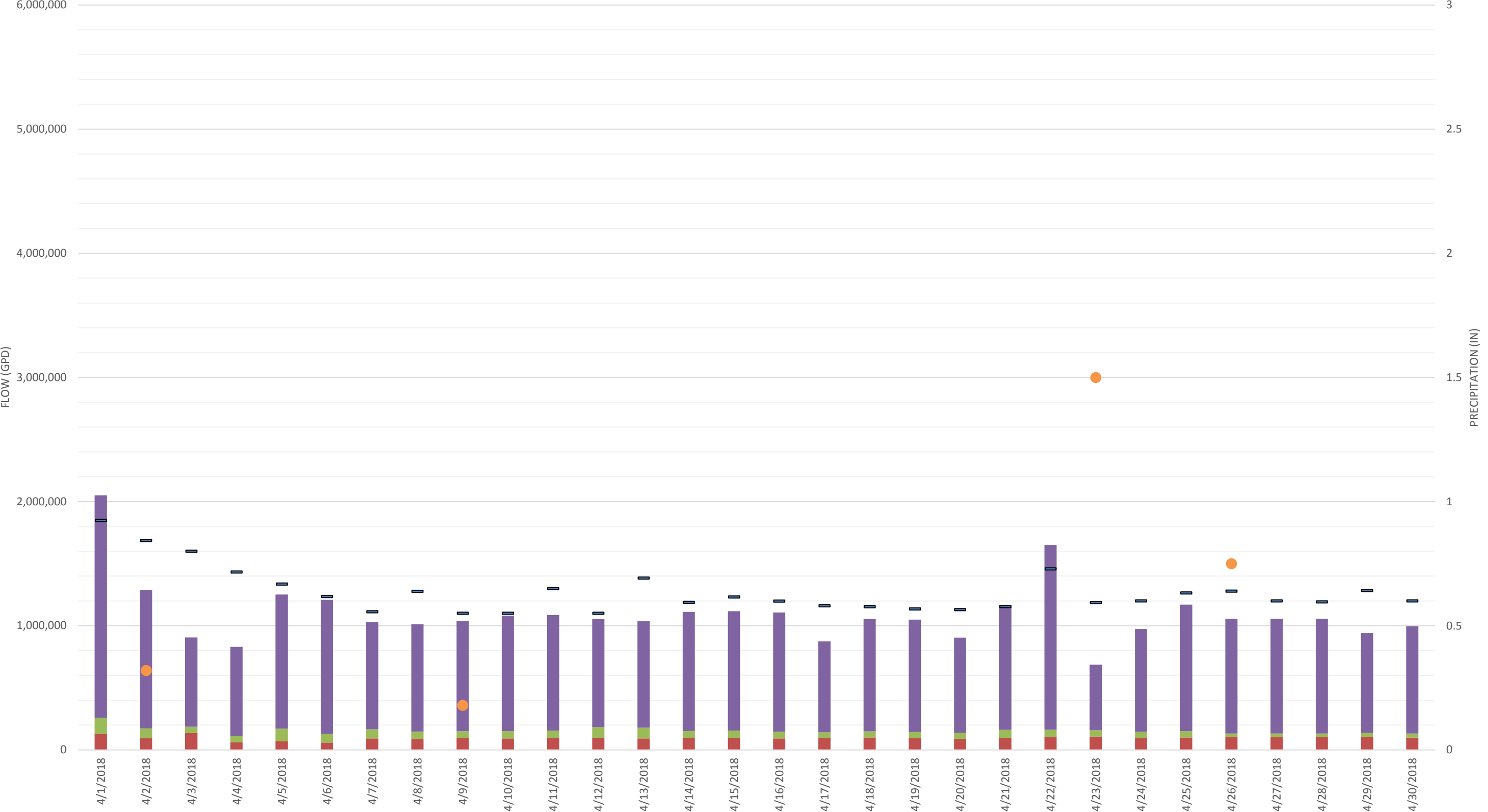
Daily Flow to North Wastewater Treatment Plant

OTC PRO REALTY FASCO NORTH PLANT PRECIPITATION



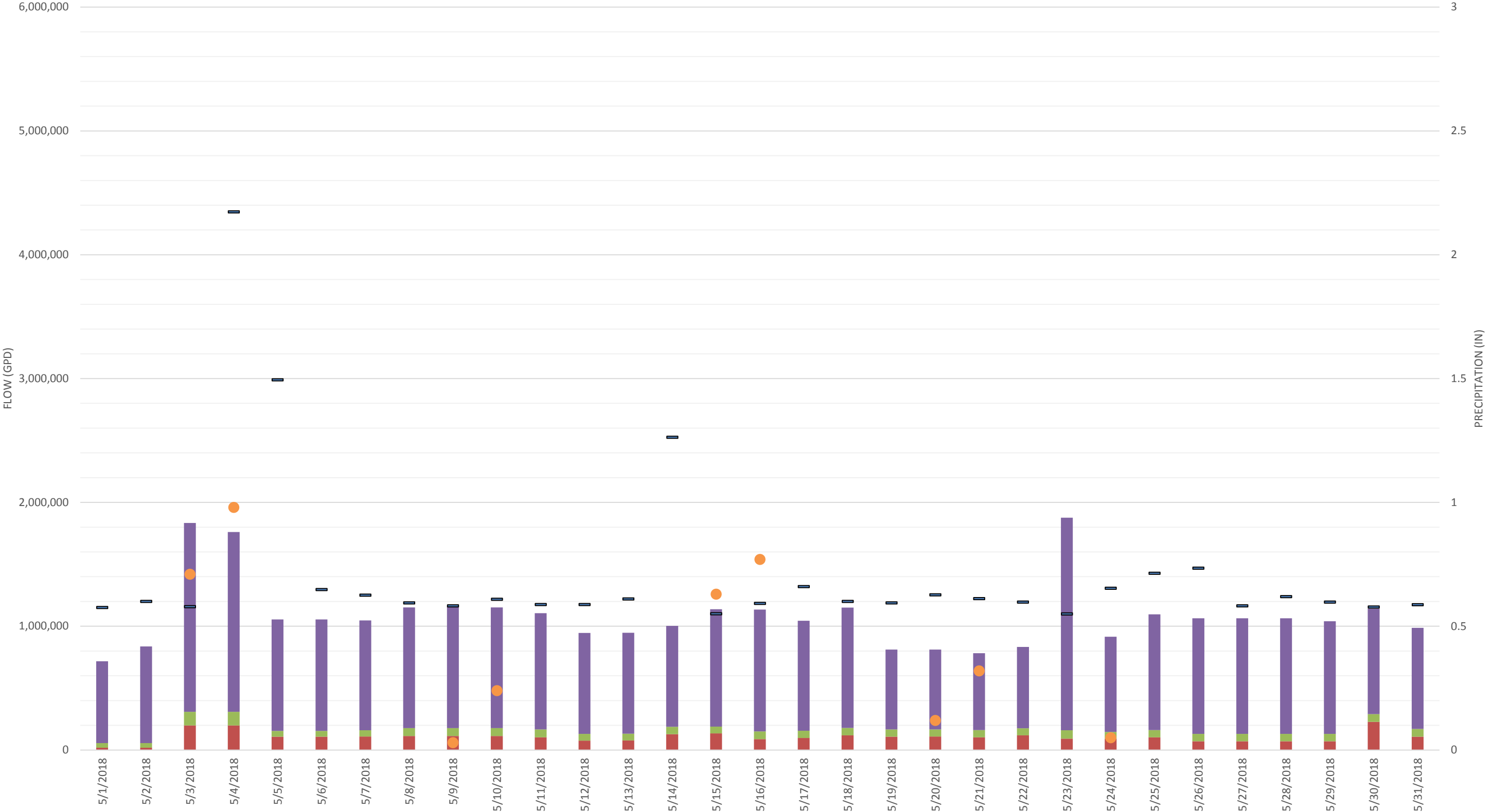
Daily Flow to North Wastewater Treatment Plant

OTC PRO REALTY FASCO NORTH PLANT PRECIPITATION



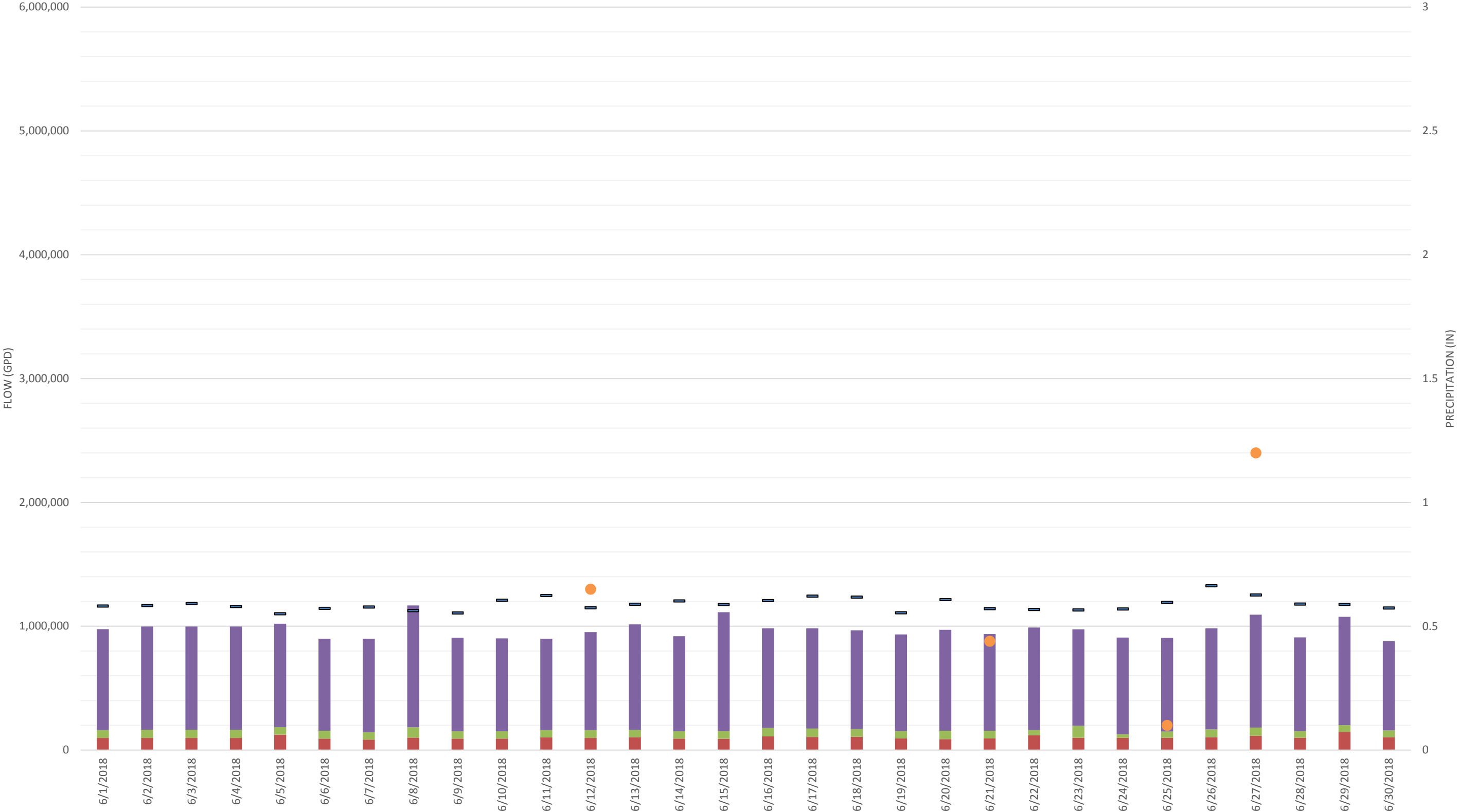
Daily Flow to North Wastewater Treatment Plant

OTC PRO REALTY FASCO NORTH PLANT PRECIPITATION

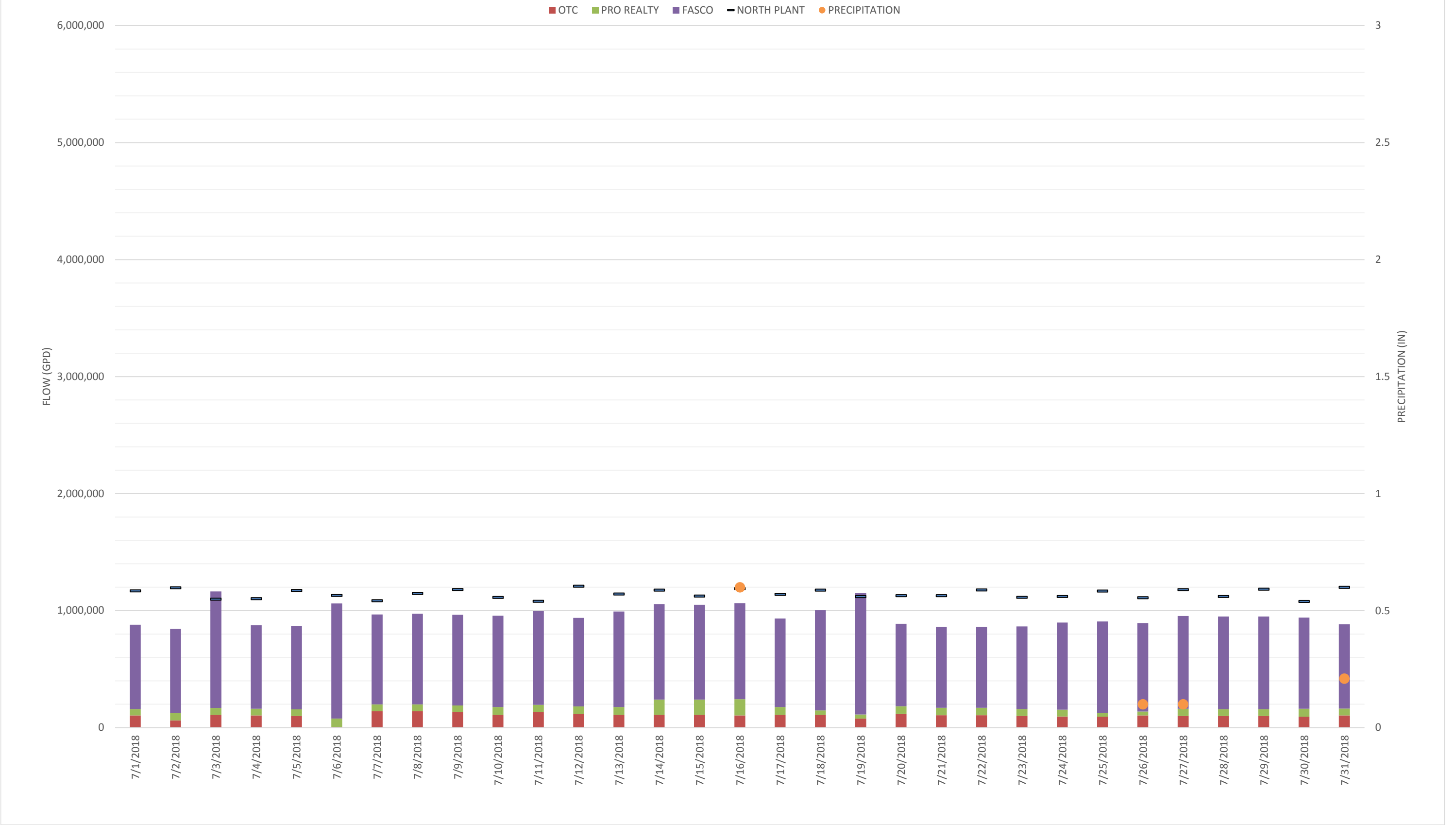


Daily Flow to North Wastewater Treatment Plant

OTC PRO REALTY FASCO NORTH PLANT PRECIPITATION

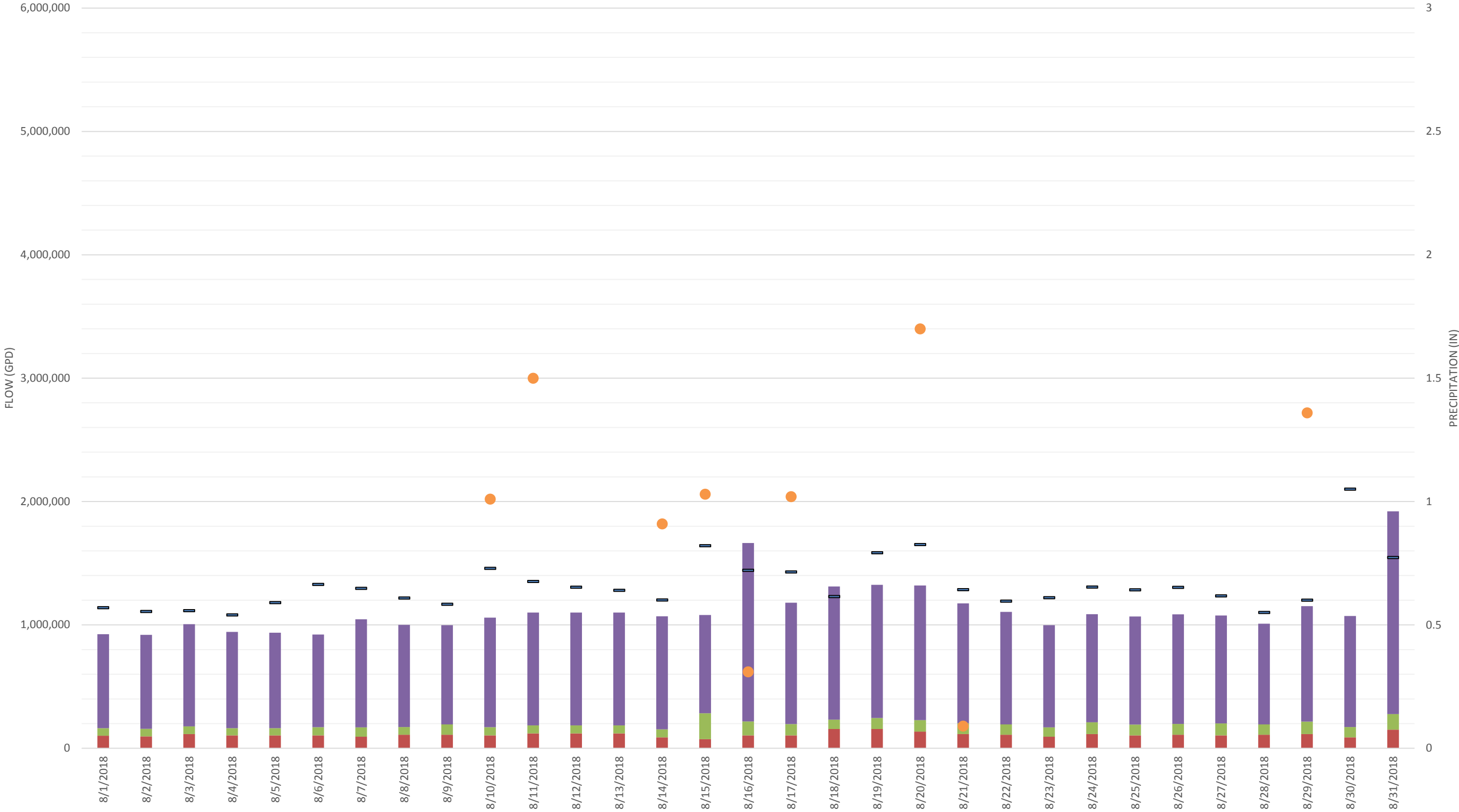


Daily Flow to North Wastewater Treatment Plant

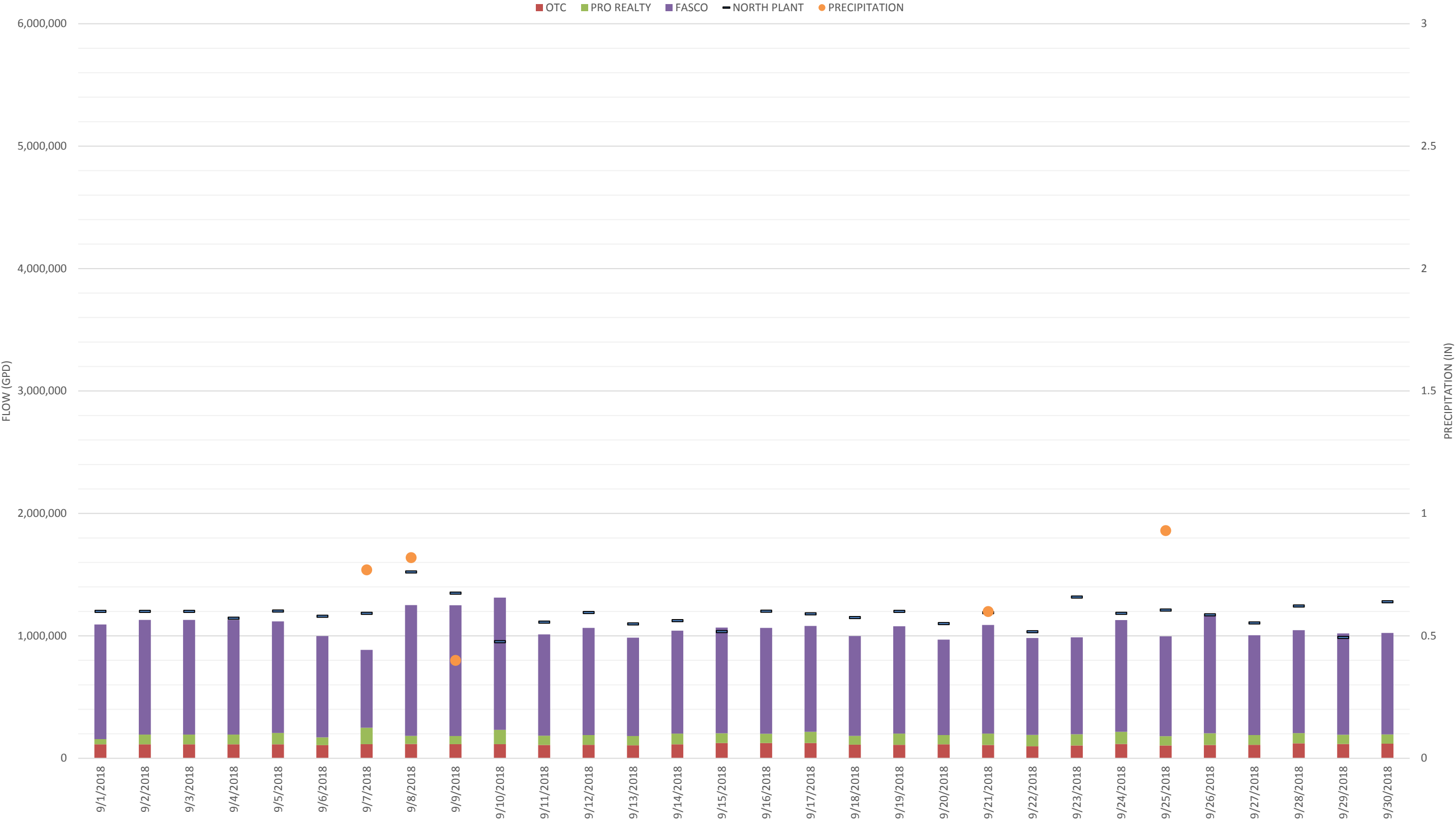


Daily Flow to North Wastewater Treatment Plant

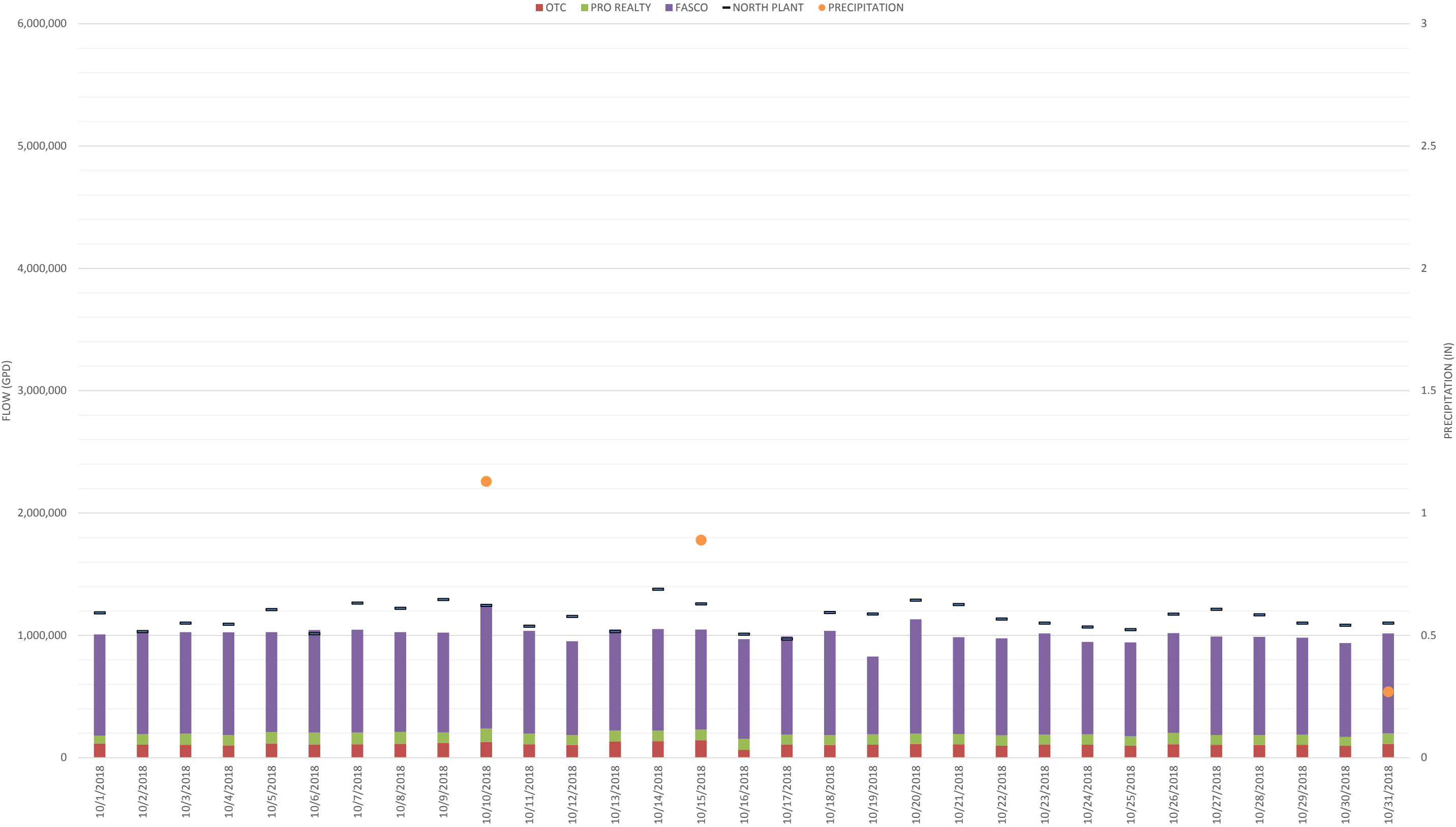
OTC PRO REALTY FASCO NORTH PLANT PRECIPITATION



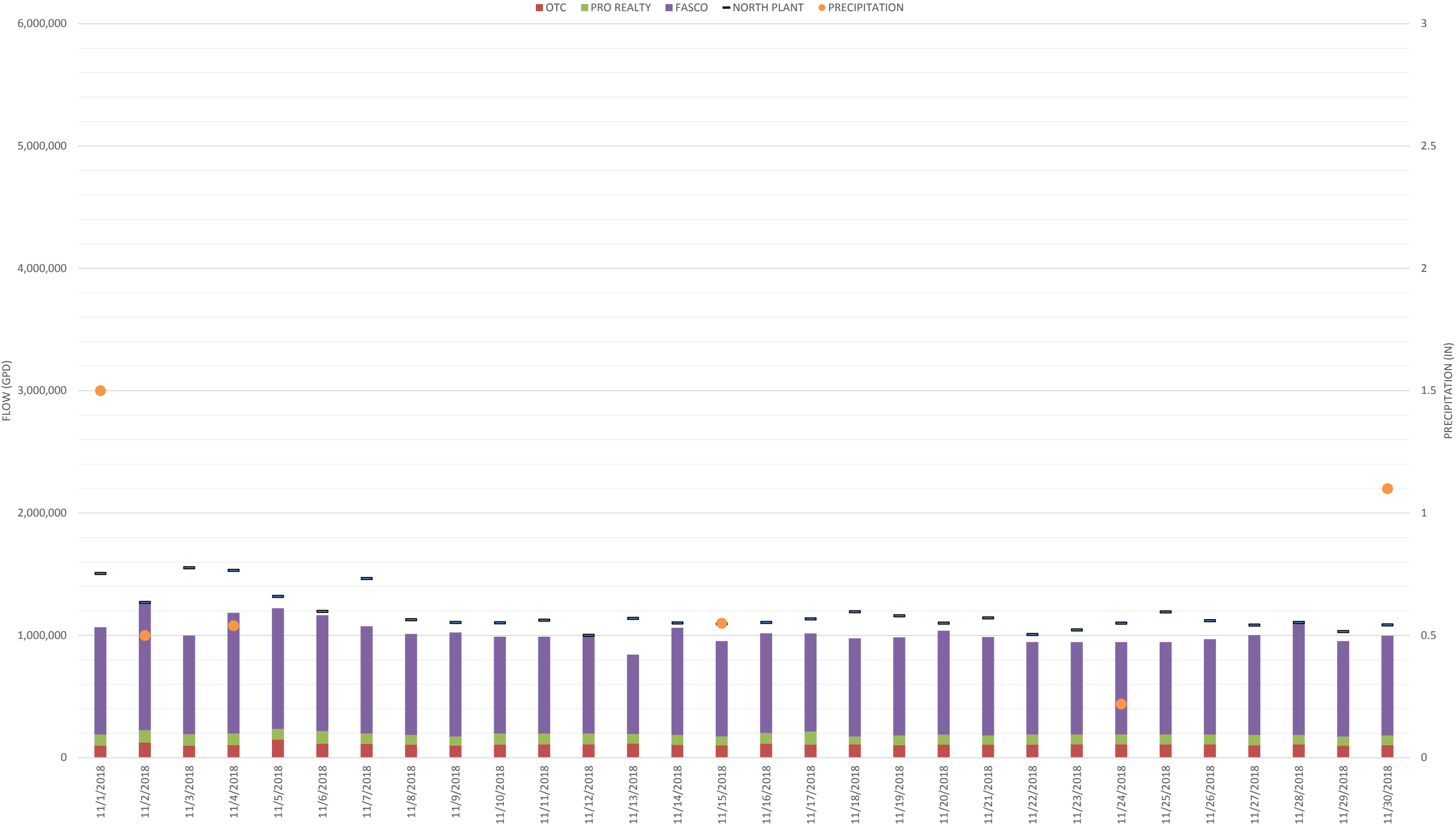
Daily Flow to North Wastewater Treatment Plant



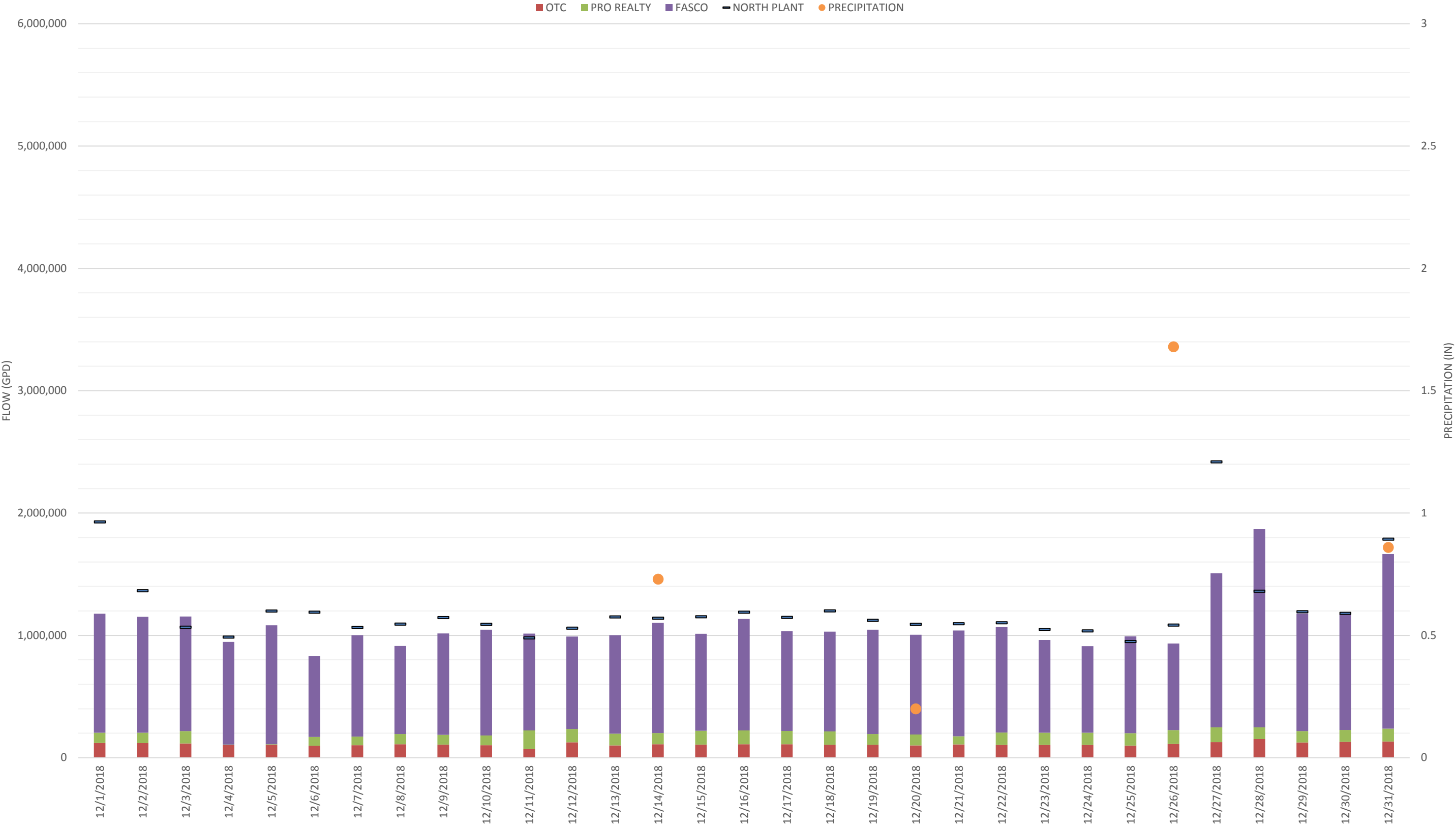
Daily Flow to North Wastewater Treatment Plant



Daily Flow to North Wastewater Treatment Plant



Daily Flow to North Wastewater Treatment Plant



APPENDIX O
LIFT STATION RUN TIME DATA

DRAFT

Average Run Time Data for FASCO Lift Station

FASCO Average Run Time (hrs)

Month	Pump 1	Pump 2	Pump 3	Total
Jul-17	0.00	3.57	3.80	7.37
Aug-17	0.00	3.84	4.71	8.55
Sep-17	0.00	3.69	3.69	7.38
Oct-17	0.00	3.11	4.76	7.87
Nov-17	0.00	2.73	4.42	7.15
Dec-17	0.00	3.04	3.37	6.41
Jan-18	0.00	3.34	6.07	9.41
Feb-18	0.00	4.44	5.99	10.43
Mar-18	0.00	2.61	4.71	7.32
Apr-18	1.86	1.89	3.10	6.85
May-18	2.19	2.36	3.85	8.40
Jun-18	1.87	1.80	2.64	6.31
Jul-18	1.84	1.88	2.65	6.37
Aug-18	2.10	1.98	3.45	7.53
Sep-18	1.61	1.54	2.39	5.54
Oct-18	1.92	1.85	2.81	6.58
Nov-18	2.00	1.86	2.83	6.69
Dec-18	2.04	1.96	3.20	7.20
Average Total	0.97	2.64	3.80	7.41
2017 Average	0.00	3.33	4.13	7.46
2018 Average	1.45	2.29	3.64	7.39

FASCO Average Run Time (hrs)

July 2017 - Dec. 2018	539.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	423.50	16023.62	24858.69	41305.81
End	891.20	17483.10	26999.00	45373.30
Avg hrs/day	0.87	2.71	3.97	7.55

July 2017 - December 2017	172.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	423.50	16023.62	24858.69	41305.81
End	425.10	16609.00	25590.40	42624.50
Avg hrs/day	0.01	3.40	4.25	7.67

January 2018 - Dec. 2018	364.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	450.50	16624.20	25607.80	42682.50
End	891.20	17483.10	26999.00	45373.30
Avg hrs/day	1.21	2.36	3.82	7.39

Average Run Time Data for Pro Realty Lift Station

Pro Realty Average Run Time (hrs)

Month	Pump 1	Pump 2	Pump 3	Total
Jul-17	0.63	0.59	0.74	1.96
Aug-17	0.64	0.52	0.75	1.91
Sep-17	0.57	0.47	0.69	1.73
Oct-17	0.60	0.51	0.60	1.71
Nov-17	0.58	0.49	0.73	1.80
Dec-17	0.63	0.51	0.81	1.95
Jan-18	0.64	0.43	0.64	1.71
Feb-18	0.82	0.65	1.04	2.51
Mar-18	0.74	0.56	0.71	2.01
Apr-18	0.58	0.20	0.57	1.35
May-18	0.73	0.00	0.79	1.52
Jun-18	0.62	0.00	0.77	1.39
Jul-18	0.63	0.00	0.96	1.59
Aug-18	0.68	0.49	0.83	2.00
Sep-18	0.59	0.51	0.46	1.56
Oct-18	0.64	0.57	0.78	1.99
Nov-18	0.64	0.49	0.76	1.89
Dec-18	0.70	0.49	0.78	1.97
Average Total	0.65	0.42	0.75	1.81
2017 Average	0.61	0.52	0.72	1.84
2018 Average	0.67	0.37	0.76	1.79

Pro Realty Average Run Time (hrs)

July 2017 - Dec. 2018	539.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	148.90	91.20	179.80	419.90
End	512.10	325.70	598.60	1436.40
Avg hrs/day	0.67	0.44	0.78	1.89

July 2017 - December 2017	172.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	148.90	91.20	179.80	419.90
End	255.60	180.30	306.10	742.00
Avg hrs/day	0.62	0.52	0.73	1.87

January 2018 - Dec. 2018	365.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	257.90	182.30	309.00	749.20
End	512.10	325.70	598.60	1436.40
Avg hrs/day	0.70	0.39	0.79	1.88

Average Run Time Data for OTC Lift Station

OTC Average Run Time (hrs)

Month	Pump 1	Pump 2	Pump 3	Total
Jul-17	1.50	0.00	0.00	1.50
Aug-17	1.60	0.38	0.17	2.15
Sep-17	0.84	0.77	0.00	1.61
Oct-17	0.57	0.61	0.42	1.60
Nov-17	0.52	0.58	0.47	1.57
Dec-17	0.52	0.58	0.45	1.55
Jan-18	0.57	0.62	0.48	1.67
Feb-18	0.73	0.80	0.63	2.16
Mar-18	0.64	0.71	0.58	1.93
Apr-18	0.56	0.59	0.54	1.69
May-18	0.70	0.76	0.73	2.19
Jun-18	0.27	0.87	0.61	1.75
Jul-18	0.06	1.15	0.73	1.94
Aug-18	0.00	1.29	0.78	2.07
Sep-18	0.00	1.04	0.61	1.65
Oct-18	0.00	1.26	0.79	2.05
Nov-18	0.00	1.24	0.79	2.03
Dec-18	0.00	1.18	0.72	1.90
Average Total	0.50	0.80	0.53	1.83
2017 Average	0.93	0.49	0.25	1.66
2018 Average	0.29	0.96	0.67	1.92

OTC Average Run Time (hrs)

July 2017 - Dec. 2018

539.00 Days

	Pump 1	Pump 2	Pump 3	Total
Start	3659.70	0.12	0.14	3659.96
End	3927.10	453.67	294.67	4675.44
Avg hrs/day	0.50	0.84	0.55	1.88

July 2017 - December 2017

172.00 Days

	Pump 1	Pump 2	Pump 3	Total
Start	3659.70	0.12	0.14	3659.96
End	3818.10	80.24	37.54	3935.88
Avg hrs/day	0.92	0.47	0.22	1.60

January 2018 - Dec. 2018

364.00 Days

	Pump 1	Pump 2	Pump 3	Total
Start	3820.40	82.57	39.58	3942.55
End	3927.10	453.67	294.67	4675.44
Avg hrs/day	0.29	1.02	0.70	2.01

Average Run Time Data for Lamberts Lift Station

Lamberts Average Run Time (hrs)

Month	Pump 1	Pump 2	Pump 3	Total
Jul-17	0.00	1.03	1.42	2.45
Aug-17	1.28	1.70	1.59	4.57
Sep-17	1.38	1.36	1.33	4.07
Oct-17	1.23	4.64	1.27	7.14
Nov-17	1.36	2.05	1.40	4.81
Dec-17	1.33	2.23	1.40	4.96
Jan-18	1.44	1.57	1.47	4.48
Feb-18	1.91	2.44	1.92	6.27
Mar-18	1.91	2.08	1.88	5.87
Apr-18	1.73	2.04	1.28	5.05
May-18	1.48	1.47	1.91	4.86
Jun-18	10.14	4.59	1.32	16.05
Jul-18	0.00	10.01	2.87	12.88
Aug-18	3.48	3.48	1.94	8.9
Sep-18	3.62	2.33	1.47	7.42
Oct-18	2.06	5.50	1.29	8.85
Nov-18	3.25	0.00	3.05	6.3
Dec-18	5.07	4.89	3.15	13.11
Average Total	2.37	2.97	1.78	7.11
2017 Average	1.32	2.17	1.40	4.67
2018 Average	3.01	3.37	1.96	8.34

Lamberts Average Run Time (hrs)

July 2017 - Dec. 2018	539.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	0.17	9556.40	4451.50	14008.07
End	1481.11	11278.20	5464.10	18223.41
Avg hrs/day	2.75	3.19	1.88	7.82

July 2017 - December 2017	172.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	0.17	9556.40	4451.50	14008.07
End	201.40	9974.10	4698.90	14874.40
Avg hrs/day	1.17	2.43	1.44	5.04

January 2018 - Dec. 2018	365.00 Days			
	Pump 1	Pump 2	Pump 3	Total
Start	207.48	9980.70	4705.20	14893.38
End	1481.11	11278.20	5464.10	18223.41
Avg hrs/day	3.49	3.55	2.08	9.12

Average Run Time Data for Shop Lift Station

Shop Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	3.35	1.37	4.72
Aug-17	1.61	1.60	3.21
Sep-17	1.93	1.57	3.50
Oct-17	2.43	1.51	3.94
Nov-17	2.10	2.55	4.65
Dec-17	3.71	2.65	6.36
Jan-18	4.50	2.71	7.21
Feb-18	5.28	3.25	8.53
Mar-18	5.09	1.45	6.54
Apr-18	3.54	1.66	5.20
May-18	3.11	1.84	4.95
Jun-18	3.20	1.62	4.82
Jul-18	2.32	3.62	5.94
Aug-18	5.95	1.91	7.86
Sep-18	2.04	1.33	3.37
Oct-18	2.75	1.68	4.43
Nov-18	5.59	1.82	7.41
Dec-18	3.48	1.58	5.06
Average Total	3.44	1.98	5.43
2017 Average	2.52	1.88	4.40
2018 Average	3.90	2.04	5.94

Shop Average Run Time (hrs)

July 2017 - Dec. 2018		539.00 Days	
	Pump 1	Pump 2	Total
Start	2542.00	2690.00	5232.00
End	4486.10	3808.60	8294.70
Avg hrs/day	3.61	2.08	5.68

July 2017 - December 2017		172.00 Days	
	Pump 1	Pump 2	Total
Start	2542.00	2690.00	5232.00
End	3002.70	3019.10	6021.80
Avg hrs/day	2.68	1.91	4.59

January 2018 - Dec. 2018		365.00 Days	
	Pump 1	Pump 2	Total
Start	3009.30	3032.40	6041.70
End	4486.10	3808.60	8294.70
Avg hrs/day	4.05	2.13	6.17

Average Run Time Data for Rivers Lift Station

Rivers Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.98	0.83	1.81
Aug-17	1.02	1.01	2.03
Sep-17	0.98	1.00	1.98
Oct-17	1.07	1.08	2.15
Nov-17	1.45	1.10	2.55
Dec-17	1.12	1.12	2.24
Jan-18	1.15	1.15	2.30
Feb-18	1.25	1.25	2.50
Mar-18	1.23	1.23	2.46
Apr-18	1.07	1.07	2.14
May-18	1.22	1.22	2.44
Jun-18	0.98	0.97	1.95
Jul-18	0.95	0.94	1.89
Aug-18	0.96	0.95	1.91
Sep-18	0.81	0.81	1.62
Oct-18	1.03	1.03	2.06
Nov-18	1.05	1.05	2.10
Dec-18	1.03	1.04	2.07
Average Total	1.08	1.05	2.12
2017 Average	1.10	1.02	2.13
2018 Average	1.06	1.06	2.12

Rivers Average Run Time (hrs)

July 2017 - Dec. 2018	539.00		Days
	Pump 1	Pump 2	Total
Start	3273.91	3144.81	6418.72
End	3874.00	3744.70	7618.70
Avg hrs/day	1.11	1.11	2.23

July 2017 - December 2017	172.00		Days
	Pump 1	Pump 2	Total
Start	3273.91	3144.81	6418.72
End	3462.20	3333.10	6795.30
Avg hrs/day	1.09	1.09	2.19

January 2018 - Dec. 2018	364.00		Days
	Pump 1	Pump 2	Total
Start	3467.50	3338.40	6805.90
End	3874.00	3744.70	7618.70
Avg hrs/day	1.12	1.12	2.23

Average Run Time Data for Rapid Roberts Lift Station

Rapid Roberts Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.76	0.73	1.49
Aug-17	1.51	1.50	3.01
Sep-17	0.91	0.85	1.76
Oct-17	1.15	1.07	2.22
Nov-17	0.86	0.89	1.75
Dec-17	1.33	1.24	2.57
Jan-18	1.04	1.00	2.04
Feb-18	2.07	1.71	3.78
Mar-18	1.70	1.50	3.20
Apr-18	1.75	1.46	3.21
May-18	1.66	1.57	3.23
Jun-18	0.63	0.72	1.35
Jul-18	0.58	0.66	1.24
Aug-18	1.44	1.49	2.93
Sep-18	0.78	1.03	1.81
Oct-18	0.79	0.95	1.74
Nov-18	0.95	1.05	2.00
Dec-18	1.48	1.28	2.76
Average Total	1.19	1.15	2.34
2017 Average	1.09	1.05	2.13
2018 Average	1.24	1.20	2.44

Rapid Roberts Average Run Time (hrs)

July 2017 - Dec. 2018		539.00 Days	
	Pump 1	Pump 2	Total
Start	2815.24	5344.53	8159.77
End	3491.54	6002.89	9494.43
Avg hrs/day	1.25	1.22	2.48

July 2017 - December 2017		172.00 Days	
	Pump 1	Pump 2	Total
Start	2815.24	5344.53	8159.77
End	3007.52	5531.23	8538.75
Avg hrs/day	1.12	1.09	2.20

January 2018 - Dec. 2018		365.00 Days	
	Pump 1	Pump 2	Total
Start	3012.90	5536.00	8548.90
End	3491.54	6002.89	9494.43
Avg hrs/day	1.31	1.28	2.59

Average Run Time Data for Campbell City Lift Station

Campbell City Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.14	0.19	0.33
Aug-17	0.16	0.25	0.41
Sep-17	0.18	0.19	0.37
Oct-17	0.15	0.29	0.44
Nov-17	0.91	1.08	1.99
Dec-17	0.76	1.20	1.96
Jan-18	1.58	1.22	2.80
Feb-18	0.64	0.38	1.02
Mar-18	1.61	0.58	2.19
Apr-18	0.10	0.09	0.19
May-18	0.16	0.12	0.28
Jun-18	0.10	0.11	0.21
Jul-18	0.32	0.13	0.45
Aug-18	0.16	0.15	0.31
Sep-18	0.10	0.15	0.25
Oct-18	0.13	0.32	0.45
Nov-18	0.13	0.30	0.43
Dec-18	0.18	0.09	0.27
Average Total	0.42	0.38	0.80
2017 Average	0.38	0.53	0.92
2018 Average	0.43	0.30	0.74

Campbell City Average Run Time (hrs)

July 2017 - Dec. 2018		537.00 Days	
	Pump 1	Pump 2	Total
Start	4463.00	3147.75	7610.75
End	4725.14	3389.27	8114.41
Avg hrs/day	0.49	0.45	0.94

July 2017 - December 2017		171.00 Days	
	Pump 1	Pump 2	Total
Start	4463.00	3147.75	7610.75
End	4510.05	3245.69	7755.74
Avg hrs/day	0.28	0.57	0.85

January 2018 - Dec. 2018		363.00 Days	
	Pump 1	Pump 2	Total
Start	4578.94	3277.12	7856.06
End	4725.14	3389.27	8114.41
Avg hrs/day	0.40	0.31	0.71

Average Run Time Data for Grand Haven Lift Station

Grand Haven Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.50	0.25	0.75
Aug-17	0.53	0.48	1.01
Sep-17	0.56	0.52	1.08
Oct-17	0.59	0.52	1.11
Nov-17	0.51	0.49	1.00
Dec-17	0.51	0.53	1.04
Jan-18	0.57	0.52	1.09
Feb-18	0.63	0.58	1.21
Mar-18	0.54	0.56	1.10
Apr-18	0.55	0.52	1.07
May-18	0.71	0.56	1.27
Jun-18	0.65	0.54	1.19
Jul-18	0.65	0.55	1.20
Aug-18	0.71	0.63	1.34
Sep-18	0.56	0.49	1.05
Oct-18	0.73	0.61	1.34
Nov-18	0.73	0.64	1.37
Dec-18	0.76	0.58	1.34
Average Total	0.61	0.53	1.14
2017 Average	0.53	0.47	1.00
2018 Average	0.65	0.57	1.21

Grand Haven Average Run Time (hrs)

July 2017 - Dec. 2018		539.00	Days
	Pump 1	Pump 2	Total
Start	1777.68	1720.50	3498.18
End	2127.04	2030.11	4157.15
Avg hrs/day	0.65	0.57	1.22
July 2017 - December 2017		172.00	Days
	Pump 1	Pump 2	Total
Start	1777.68	1720.50	3498.18
End	1873.14	1808.07	3681.21
Avg hrs/day	0.56	0.51	1.06
January 2018 - Dec. 2018		364.00	Days
	Pump 1	Pump 2	Total
Start	1875.46	1810.61	3686.07
End	2127.04	2030.11	4157.15
Avg hrs/day	0.69	0.60	1.29

Average Run Time Data for Knoll Ridge Lift Station

Knoll Ridge Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.44	0.51	0.95
Aug-17	0.54	0.52	1.06
Sep-17	0.55	0.52	1.07
Oct-17	0.58	0.55	1.13
Nov-17	0.58	0.55	1.13
Dec-17	0.71	0.67	1.38
Jan-18	1.70	0.93	2.63
Feb-18	0.95	0.83	1.78
Mar-18	1.00	1.02	2.02
Apr-18	0.83	0.80	1.63
May-18	0.89	0.86	1.75
Jun-18	0.47	0.45	0.92
Jul-18	0.51	0.49	1.00
Aug-18	0.49	0.48	0.97
Sep-18	0.34	0.34	0.68
Oct-18	0.47	0.45	0.92
Nov-18	0.53	0.50	1.03
Dec-18	0.50	0.49	0.99
Average Total	0.67	0.61	1.28
2017 Average	0.57	0.55	1.12
2018 Average	0.72	0.64	1.36

Knoll Ridge Average Run Time (hrs)

July 2017 - Dec. 2018	539.00 Days		
	Pump 1	Pump 2	Total
Start	1448.08	756.12	2204.20
End	1805.80	1097.80	2903.60
Avg hrs/day	0.66	0.63	1.30

July 2017 - December 2017	174.00 Days		
	Pump 1	Pump 2	Total
Start	1448.08	756.12	2204.20
End	1549.30	854.08	2403.38
Avg hrs/day	0.58	0.56	1.14

January 2018 - Dec. 2018	365.00 Days		
	Pump 1	Pump 2	Total
Start	1533.55	857.92	2391.47
End	1805.80	1097.80	2903.60
Avg hrs/day	0.75	0.66	1.40

Average Run Times for Petrus Lift Station

Petrus Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.59	0.63	1.22
Aug-17	0.64	0.66	1.30
Sep-17	0.58	0.61	1.19
Oct-17	0.59	0.56	1.15
Nov-17	2.96	0.33	3.29
Dec-17	0.63	0.59	1.22
Jan-18	0.63	0.62	1.25
Feb-18	0.97	0.90	1.87
Mar-18	0.81	0.78	1.59
Apr-18	0.63	0.58	1.21
May-18	2.07	0.79	2.86
Jun-18	0.60	0.58	1.18
Jul-18	1.91	0.72	2.63
Aug-18	0.83	1.29	2.12
Sep-18	0.49	0.38	0.87
Oct-18	0.63	0.47	1.10
Nov-18	0.81	0.40	1.21
Dec-18	0.93	0.42	1.35
Average Total	0.96	0.63	1.59
2017 Average	1.00	0.56	1.56
2018 Average	0.94	0.66	1.60

Petrus Average Run Time (hrs)

July 2017 - Dec. 2018		539.00		Days
	Pump 1	Pump 2	Total	
Start	4297.80	5371.00	9668.80	
End	4838.60	5725.10	10563.70	
Avg hrs/day	1.00	0.66	1.66	

July 2017 - December 2017		172.00		Days
	Pump 1	Pump 2	Total	
Start	4297.80	5371.00	9668.80	
End	4473.10	5469.20	9942.30	
Avg hrs/day	1.02	0.57	1.59	

January 2018 - Dec. 2018		364.00		Days
	Pump 1	Pump 2	Total	
Start	4475.90	5471.80	9947.70	
End	4838.60	5725.10	10563.70	
Avg hrs/day	1.00	0.70	1.69	

Average Run Time Data for Barrington Springs Lift Station

Barrington Springs Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.81	0.94	1.75
Aug-17	0.88	0.99	1.87
Sep-17	0.83	0.94	1.77
Oct-17	0.97	1.03	2.00
Nov-17	0.80	0.97	1.77
Dec-17	0.95	1.07	2.02
Jan-18	1.05	0.53	1.58
Feb-18	1.15	1.39	2.54
Mar-18	1.16	1.30	2.46
Apr-18	0.00	2.38	2.38
May-18	0.00	1.49	1.49
Jun-18	0.39	1.54	1.93
Jul-18	0.91	0.94	1.85
Aug-18	0.93	0.96	1.89
Sep-18	0.81	0.83	1.64
Oct-18	1.04	1.09	2.13
Nov-18	1.06	1.07	2.13
Dec-18	1.06	1.04	2.10
Average Total	0.82	1.14	1.96
2017 Average	0.87	0.99	1.86
2018 Average	0.80	1.21	2.01

Barrington Springs Average Run Time (hrs)

July 2017 - Dec. 2018	539.00		Days
	Pump 1	Pump 2	Total
Start	3490.91	4647.48	8138.39
End	3971.00	5321.40	9292.40
Avg hrs/day	0.89	1.25	2.14

July 2017 - Dec. 2017	172.00		Days
	Pump 1	Pump 2	Total
Start	3490.91	4647.48	8138.39
End	3647.80	4823.89	8471.69
Avg hrs/day	0.91	1.03	1.94

January 2018 - Dec. 2018	364.00		Days
	Pump 1	Pump 2	Total
Start	3652.34	4829.02	8481.36
End	3971.00	5321.40	9292.40
Avg hrs/day	0.88	1.35	2.23

Average Run Time Data for West Elementary School Lift Station

West Elementary School Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.11	0.00	0.11
Aug-17	0.09	0.00	0.09
Sep-17	0.10	0.10	0.20
Oct-17	0.12	0.13	0.25
Nov-17	0.12	0.16	0.28
Dec-17	0.11	0.17	0.28
Jan-18	0.14	0.16	0.30
Feb-18	0.17	0.20	0.37
Mar-18	0.15	0.16	0.31
Apr-18	0.13	0.16	0.29
May-18	0.11	0.15	0.26
Jun-18	0.09	0.11	0.20
Jul-18	0.09	0.16	0.25
Aug-18	0.11	0.16	0.27
Sep-18	0.14	0.24	0.38
Oct-18	0.10	0.27	0.37
Nov-18	0.19	0.20	0.39
Dec-18	0.15	0.18	0.33
Average Total	0.12	0.15	0.27
2017 Average	0.11	0.09	0.20
2018 Average	0.13	0.18	0.31

West Elementary School Average Run Time (hrs)

July 2017 - Dec. 2018		539.00	Days
	Pump 1	Pump 2	Total
Start	948.90	428.30	1377.20
End	1019.00	517.00	1536.00
Avg hrs/day	0.13	0.16	0.29
July 2017 - December 2017		172.00	Days
	Pump 1	Pump 2	Total
Start	948.90	428.30	1377.20
End	967.60	445.70	1413.30
Avg hrs/day	0.11	0.10	0.21
January 2018 - Dec. 2018		364.00	Days
	Pump 1	Pump 2	Total
Start	968.00	446.40	1414.40
End	1019.00	517.00	1536.00
Avg hrs/day	0.14	0.19	0.33

Average Run Time Data for Kali Springs Lift Station

Kali Springs Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.34	0.46	0.80
Aug-17	0.55	0.69	1.24
Sep-17	0.38	0.67	1.05
Oct-17	0.64	0.86	1.50
Nov-17	0.39	0.37	0.76
Dec-17	0.59	0.13	0.72
Jan-18	0.63	0.38	1.01
Feb-18	0.86	1.25	2.11
Mar-18	1.05	1.18	2.23
Apr-18	0.89	0.95	1.84
May-18	0.73	0.58	1.31
Jun-18	0.41	0.60	1.01
Jul-18	0.39	0.62	1.01
Aug-18	0.53	0.82	1.35
Sep-18	0.53	0.72	1.25
Oct-18	0.86	1.07	1.93
Nov-18	0.96	1.14	2.10
Dec-18	0.89	1.08	1.97
Average Total	0.65	0.75	1.40
2017 Average	0.48	0.53	1.01
2018 Average	0.73	0.87	1.59

Kali Springs Average Run Time (hrs)

July 2017 - Dec. 2018		539.00 Days	
	Pump 1	Pump 2	Total
Start	2570.10	3706.90	6277.00
End	2937.80	4134.80	7072.60
Avg hrs/day	0.68	0.79	1.48

July 2017 - December 2017		174.00 Days	
	Pump 1	Pump 2	Total
Start	2570.10	3706.90	6277.00
End	2656.20	3801.30	6457.50
Avg hrs/day	0.49	0.54	1.04

January 2018 - May 2018		365.00 Days	
	Pump 1	Pump 2	Total
Start	2660.40	3801.30	6461.70
End	2937.80	4134.80	7072.60
Avg hrs/day	0.76	0.91	1.67

Average Run Time Data for Shanaclaire Lift Station

Shanaclaire Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.23	0.22	0.45
Aug-17	0.30	0.50	0.80
Sep-17	0.25	0.23	0.48
Oct-17	0.25	0.24	0.49
Nov-17	0.25	0.24	0.49
Dec-17	0.25	0.24	0.49
Jan-18	0.27	0.25	0.52
Feb-18	0.37	0.28	0.65
Mar-18	0.26	0.26	0.52
Apr-18	0.23	0.22	0.45
May-18	0.00	0.51	0.51
Jun-18	0.00	0.44	0.44
Jul-18	0.00	0.50	0.50
Aug-18	0.28	0.27	0.55
Sep-18	0.22	0.21	0.43
Oct-18	0.26	0.25	0.51
Nov-18	0.23	0.22	0.45
Dec-18	0.25	0.24	0.49
Average Total	0.22	0.30	0.51
2017 Average	0.26	0.28	0.53
2018 Average	0.20	0.30	0.50

Shanaclaire Average Run Time (hrs)

July 2017 - Dec. 2018		539.00		Days
	Pump 1	Pump 2	Total	
Start	1070.34	1092.78	2163.12	
End	1189.93	1253.37	2443.30	
Avg hrs/day	0.22	0.30	0.52	

July 2017 - December 2017		172.00		Days
	Pump 1	Pump 2	Total	
Start	1070.34	1092.78	2163.12	
End	1114.98	1135.52	2250.50	
Avg hrs/day	0.26	0.25	0.51	

January 2018 - Dec. 2018		364.00		Days
	Pump 1	Pump 2	Total	
Start	1116.10	1136.50	2252.60	
End	1189.93	1253.37	2443.30	
Avg hrs/day	0.20	0.32	0.52	

Average Run Time Data for Kimmons Lift Station

Kimmons Average Run Time (hrs)

Month	Pump 1	Pump 2	Pump 3	Total
Jul-17	0.00	0.00	0.00	0.00
Aug-17	0.00	0.50	0.36	0.86
Sep-17	0.00	0.42	0.42	0.84
Oct-17	0.00	0.42	0.33	0.75
Nov-17	0.00	0.33	0.29	0.62
Dec-17	0.00	0.43	0.17	0.60
Jan-18	0.00	0.41	0.11	0.52
Feb-18	0.00	0.48	0.30	0.78
Mar-18	0.00	0.47	0.22	0.69
Apr-18	0.00	0.98	0.02	1.00
May-18	0.00	0.72	0.11	0.83
Jun-18	0.00	0.39	0.31	0.70
Jul-18	0.00	0.46	0.34	0.80
Aug-18	0.34	0.22	0.23	0.79
Sep-18	0.48	0.17	0.19	0.84
Oct-18	0.69	0.21	0.21	1.11
Nov-18	0.64	0.22	0.06	0.92
Dec-18	0.71	0.20	0.10	1.01
Average Total	0.02	0.41	0.22	0.80
2017 Average	0.00	0.42	0.31	0.61
2018 Average	0.24	0.41	0.18	0.83

Kimmons Average Run Time (hrs)

July 2017 - Dec. 2018		536.00 Days		
	Pump 1	Pump 2	Pump 3	Total
Start	200.69	0.12	0.12	200.93
End	294.90	223.10	121.68	639.68
Avg hrs/day	0.18	0.42	0.23	0.82

July 2017 - December 2017		171.00 Days		
	Pump 1	Pump 2	Pump 3	Total
Start	200.69	0.12	0.12	200.93
End	200.69	67.36	50.29	318.34
Avg hrs/day	0.00	0.39	0.29	0.69

January 2018 - May 2018		365.00 Days		
	Pump 1	Pump 2	Pump 3	Total
Start	200.69	69.30	51.45	321.44
End	294.90	223.10	121.68	639.68
Avg hrs/day	0.26	0.42	0.19	0.87

Average Run Time Data for Riverside Lift Station

Riverside Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.41	0.41	0.82
Aug-17	0.44	0.46	0.90
Sep-17	0.40	0.40	0.80
Oct-17	0.44	0.44	0.88
Nov-17	0.46	0.49	0.95
Dec-17	0.52	0.52	1.04
Jan-18	0.50	0.50	1.00
Feb-18	0.54	0.53	1.07
Mar-18	0.52	0.47	0.99
Apr-18	0.43	0.43	0.86
May-18	0.54	0.54	1.08
Jun-18	0.42	0.45	0.87
Jul-18	0.33	0.61	0.94
Aug-18	0.00	0.68	0.68
Sep-18	0.76	0.00	0.76
Oct-18	1.05	0.00	1.05
Nov-18	0.54	0.39	0.93
Dec-18	1.21	0.54	1.75
Average Total	0.53	0.44	0.96
2017 Average	0.45	0.45	0.90
2018 Average	0.57	0.43	1.00

Riverside Average Run Time (hrs)

July 2017 - Dec. 2018		539.00 Days	
	Pump 1	Pump 2	Total
Start	206.80	216.90	423.70
End	525.40	464.80	990.20
Avg hrs/day	0.59	0.46	1.05

July 2017 - December 2017		172.00 Days	
	Pump 1	Pump 2	Total
Start	206.80	216.90	423.70
End	287.20	297.60	584.80
Avg hrs/day	0.47	0.47	0.94

January 2018 - Dec. 2018		364.00 Days	
	Pump 1	Pump 2	Total
Start	289.60	299.90	589.50
End	525.40	464.80	990.20
Avg hrs/day	0.65	0.45	1.10

Average Run Time Data for McGuffey Lift Station

McGuffey Average Run Time (hrs)

Month	Pump 1	Pump 2	Total
Jul-17	0.80	0.26	1.06
Aug-17	0.93	0.43	1.36
Sep-17	0.97	0.54	1.51
Oct-17	0.95	0.61	1.56
Nov-17	1.03	0.67	1.70
Dec-17	0.93	0.62	1.55
Jan-18	0.93	0.60	1.53
Feb-18	0.94	0.61	1.55
Mar-18	0.87	0.63	1.50
Apr-18	0.79	0.62	1.41
May-18	0.59	0.69	1.28
Jun-18	0.62	0.67	1.29
Jul-18	0.63	0.60	1.23
Aug-18	0.64	1.06	1.70
Sep-18	0.50	1.87	2.37
Oct-18	0.67	1.27	1.94
Nov-18	0.66	1.50	2.16
Dec-18	0.76	1.07	1.83
Average Total	0.79	0.80	1.59
2017 Average	0.94	0.52	1.46
2018 Average	0.72	0.93	1.65

McGuffey Average Run Time (hrs)

July 2017 - Dec. 2018	539.00		Days
	Pump 1	Pump 2	Total
Start	2516.50	2116.40	4632.90
End	2964.10	2579.40	5543.50
Avg hrs/day	0.83	0.86	1.69

July 2017 - December 2017	174.00		Days
	Pump 1	Pump 2	Total
Start	2516.50	2116.40	4632.90
End	2680.70	2210.30	4891.00
Avg hrs/day	0.94	0.54	1.48

January 2018 - Dec. 2018	365.00		Days
	Pump 1	Pump 2	Total
Start	2684.70	2212.30	4897.00
End	2964.10	2579.40	5543.50
Avg hrs/day	0.77	1.01	1.77

APPENDIX P

LIFT STATIONS, SIPHON AND WWTP SERVICE AREAS

DRAFT

DWG NAME: W:\SW-Projects\SW18-130 - Sanitary Sewer Study - City of Ozark (18-7445)\AutoCad Drawings\SW18-130 - Base Plans\Sanitary Sewer Study.dwg LAYOUT TAB: Existing SAN Tributaries Map PLOTTED ON: Oct 21, 2020 - 3:44pm PLOTTED BY: kburns

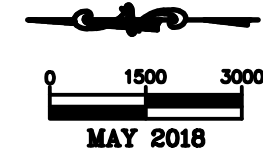
PRELIMINARY DRAWING

FOR REVIEW PURPOSES ONLY
NOT TO BE USED FOR CONSTRUCTION

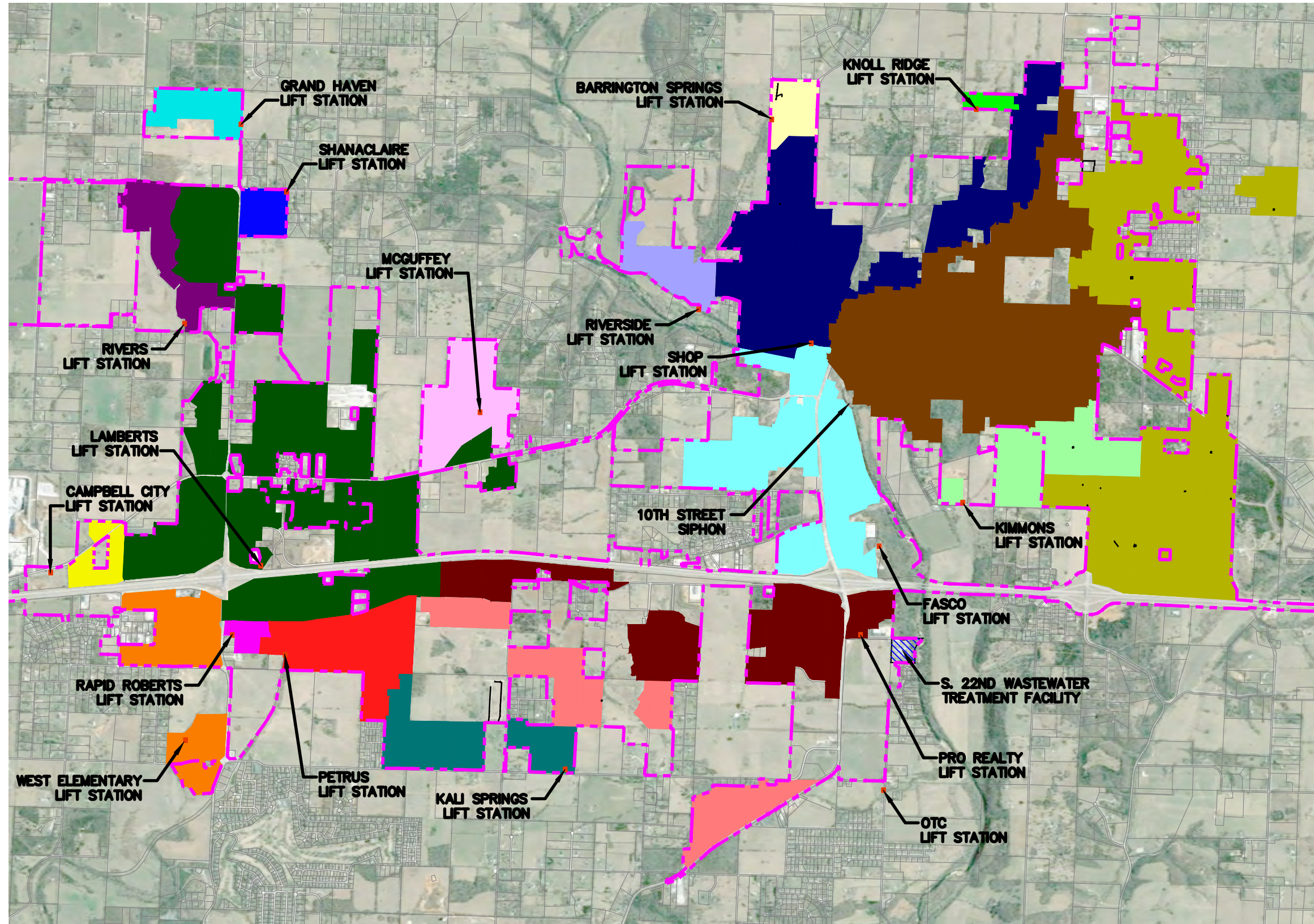
CITY OF OZARK

EXISTING SANITARY SEWER

TRIBUTARY MAP



- OZARK CITY LIMITS
- BARRINGTON SPRING LIFT STATION
- CAMPBELL CITY LIFT STATION
- ELK VALLEY TREATMENT PLANT
- FASCO LIFT STATION
- GRAND HAVEN LIFT STATION
- KALI SPRINGS LIFT STATION
- KIMMONS LIFT STATION
- KNOLL RIDGE LIFT STATION
- LAMBERTS LIFT STATION
- MCGUFFEY LIFT STATION
- OTC LIFT STATION
- PETRUS LIFT STATION
- PRO REALTY LIFT STATION
- RAPID ROBERTS LIFT STATION
- RIVERS LIFT STATION
- RIVERSIDE LIFT STATION
- SHANACLAIRE LIFT STATION
- SHOP LIFT STATION
- 10TH STREET SIPHON
- WEST ELEMENTARY LIFT STATION



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COCHRAN

Missouri State Certificate
of Authority Numbers:
Engineering : 2017032025

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- Site Development
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- Master Planning

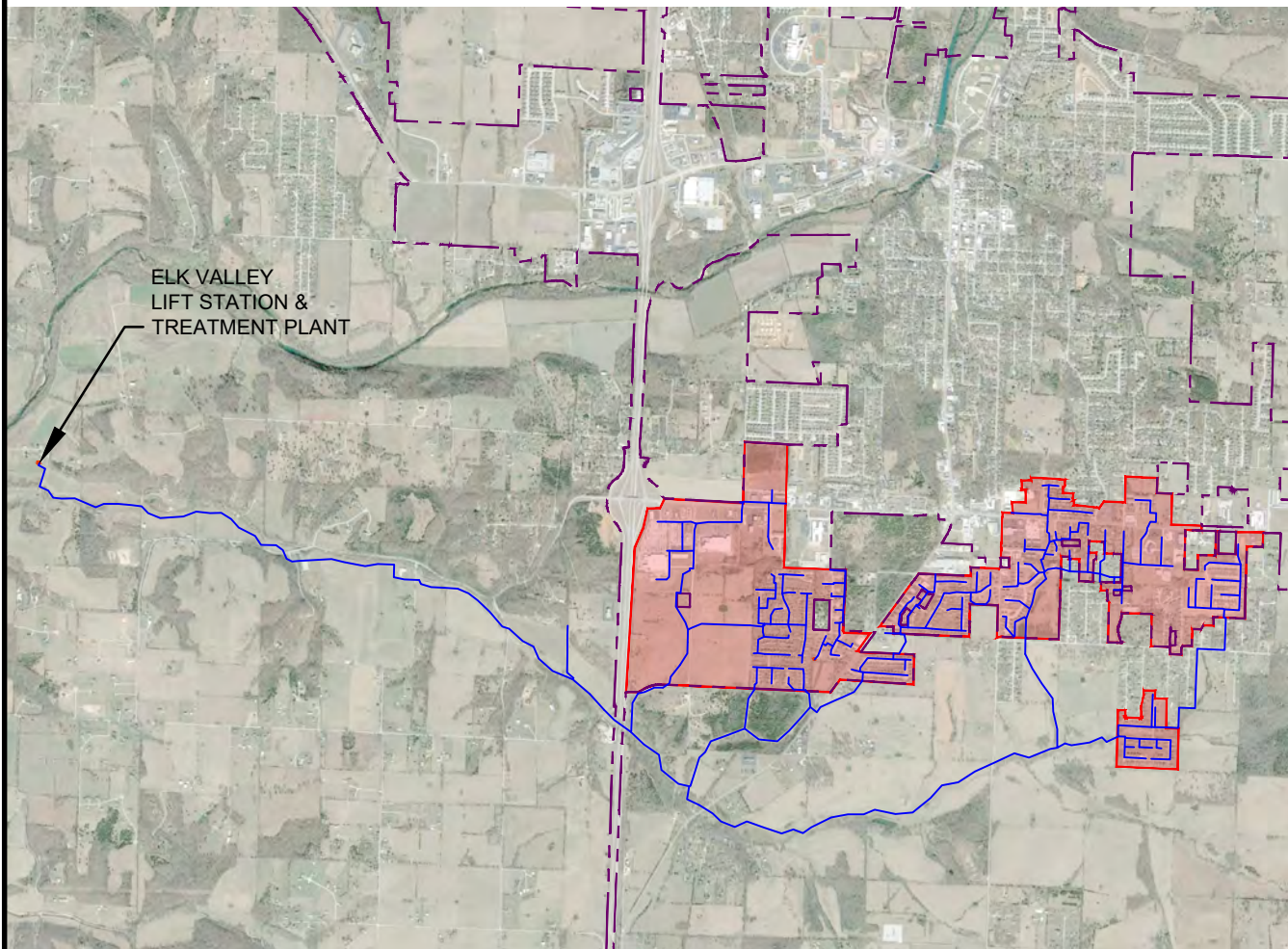
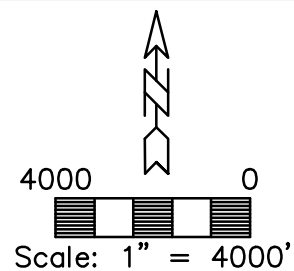
Three working days prior to
start of any excavation
on the site, the contractor
call 1-800-DOG-RITE for utility
location information.

All OSHA rules & regulations
established for the type of
construction required by these
plans shall be strictly followed
(e.g. trenching, blasting, etc.)

EXISTING SANITARY SEWER
TRIBUTARY MAP
CITY OF OZARK

EXISTING SANITARY SEWER MAP	
DATE: REVISION:	DATE: REVISION:
DRAWN BY: CLD	APPROVED BY: MHB
DATE: MAY 2018	
SCALE: 1" = 3000'	
PROJ. NO.: SW18-130	
DWG. NO.: EX-1	

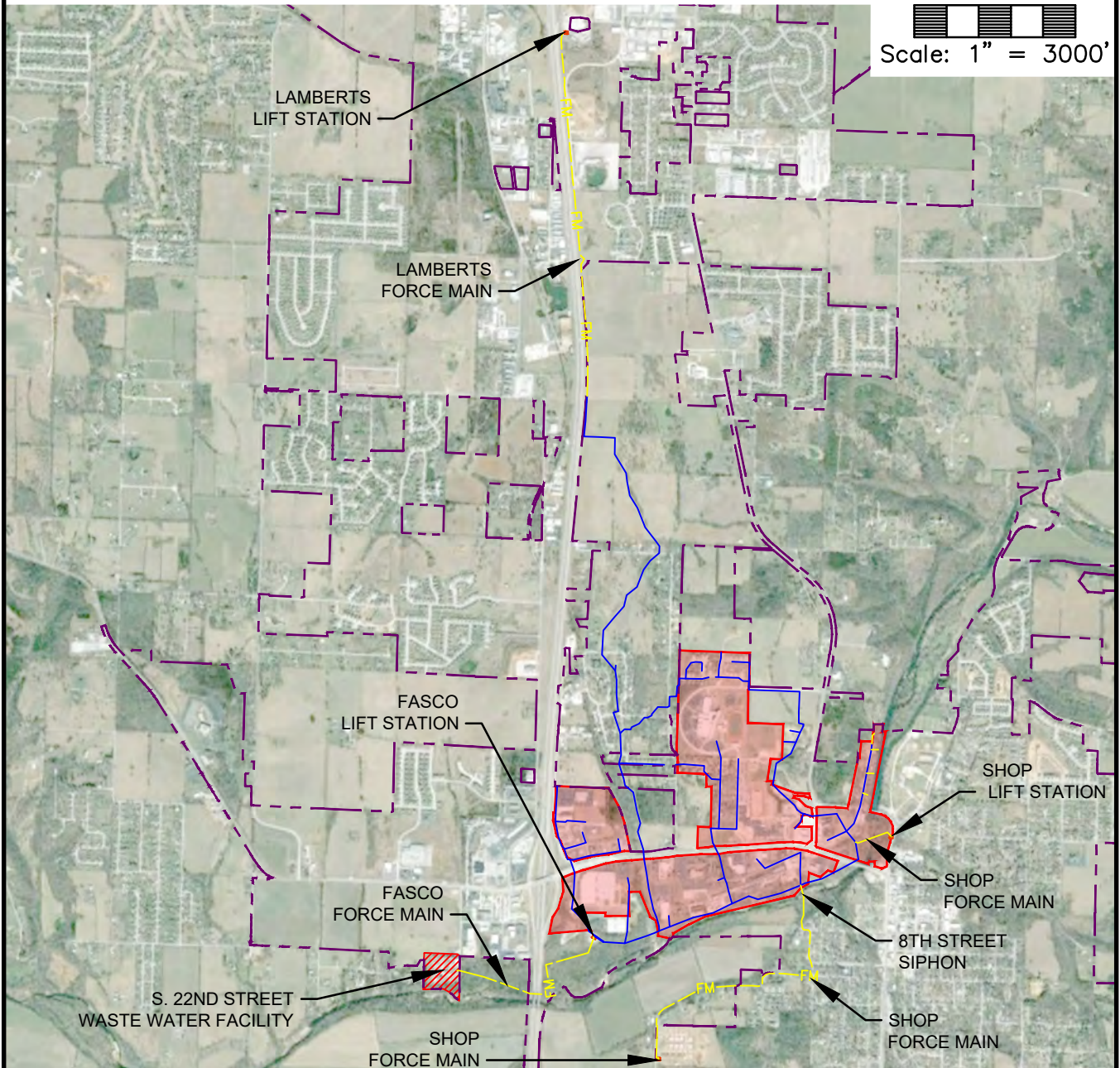
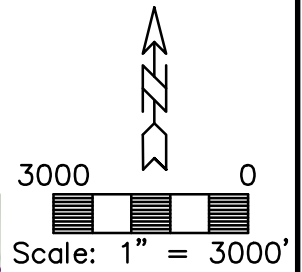
EXISTING PUBLIC SANITARY SEWER SYSTEM TO ELK VALLEY LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
1,173 Residential, 64 Non-Residential

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DWN. BY CLD	DATE 5-3-18	PROJ. NO. SW18-130

EXISTING PUBLIC SANITARY SEWER SYSTEM TO FASCO LIFT STATION



--- OZARK CITY LIMITS

—FM— EXISTING FORCE MAIN

— EXISTING SANITARY
SEWER MAIN

Existing Tributary Areas -
1303 Residential, 215 Non-Residential

Kimmons Lift Station
25,338 GPD

Lamberts Lift Station
703,800 GPD

Shop Lift Station
272,640 GPD



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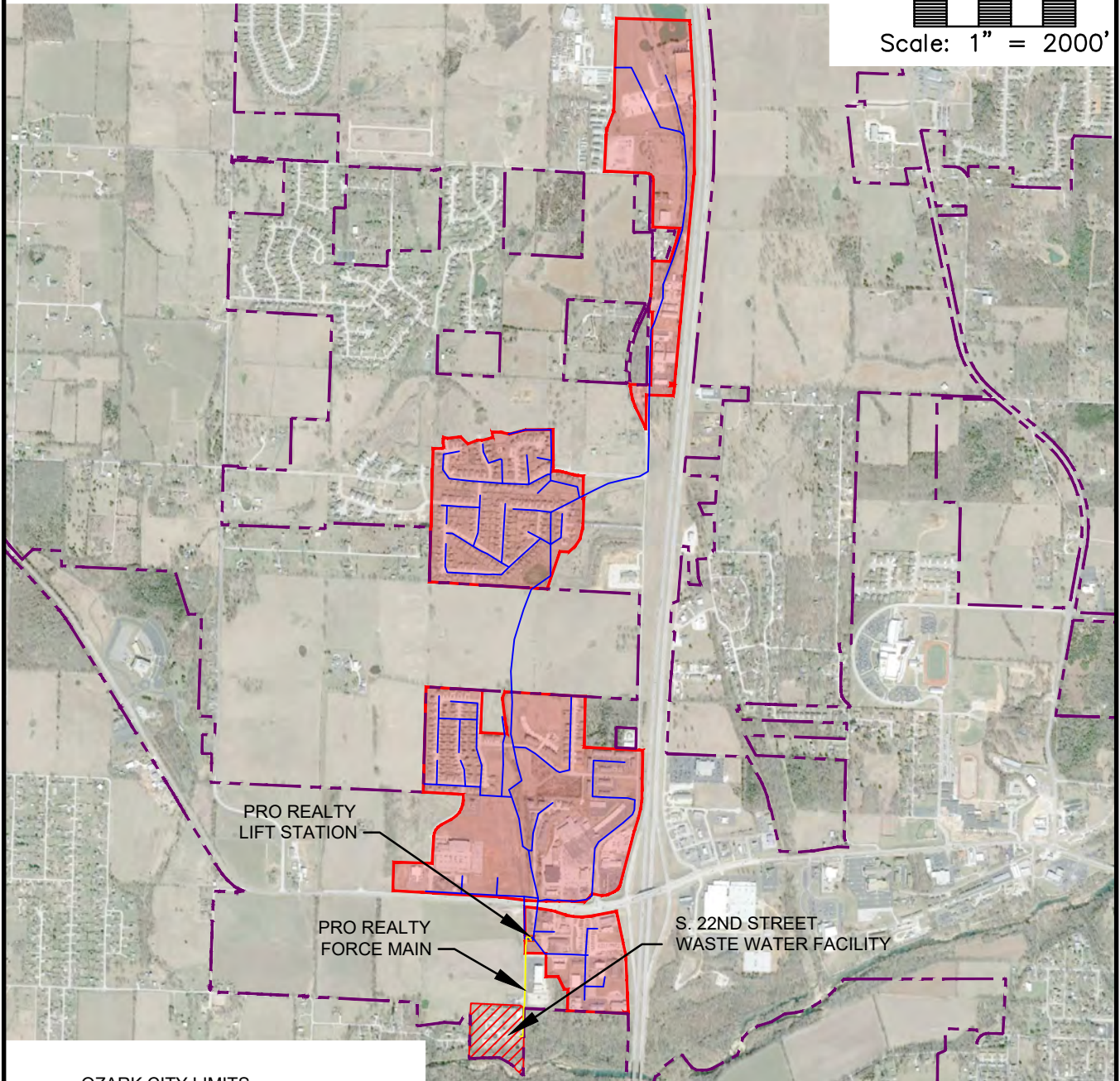
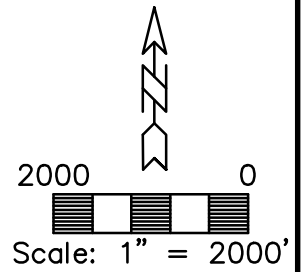
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DATE
5-3-18

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SW18-130

EXISTING PUBLIC SANITARY SEWER SYSTEM TO PRO REALTY LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
587 Residential, 56 Non-Residential



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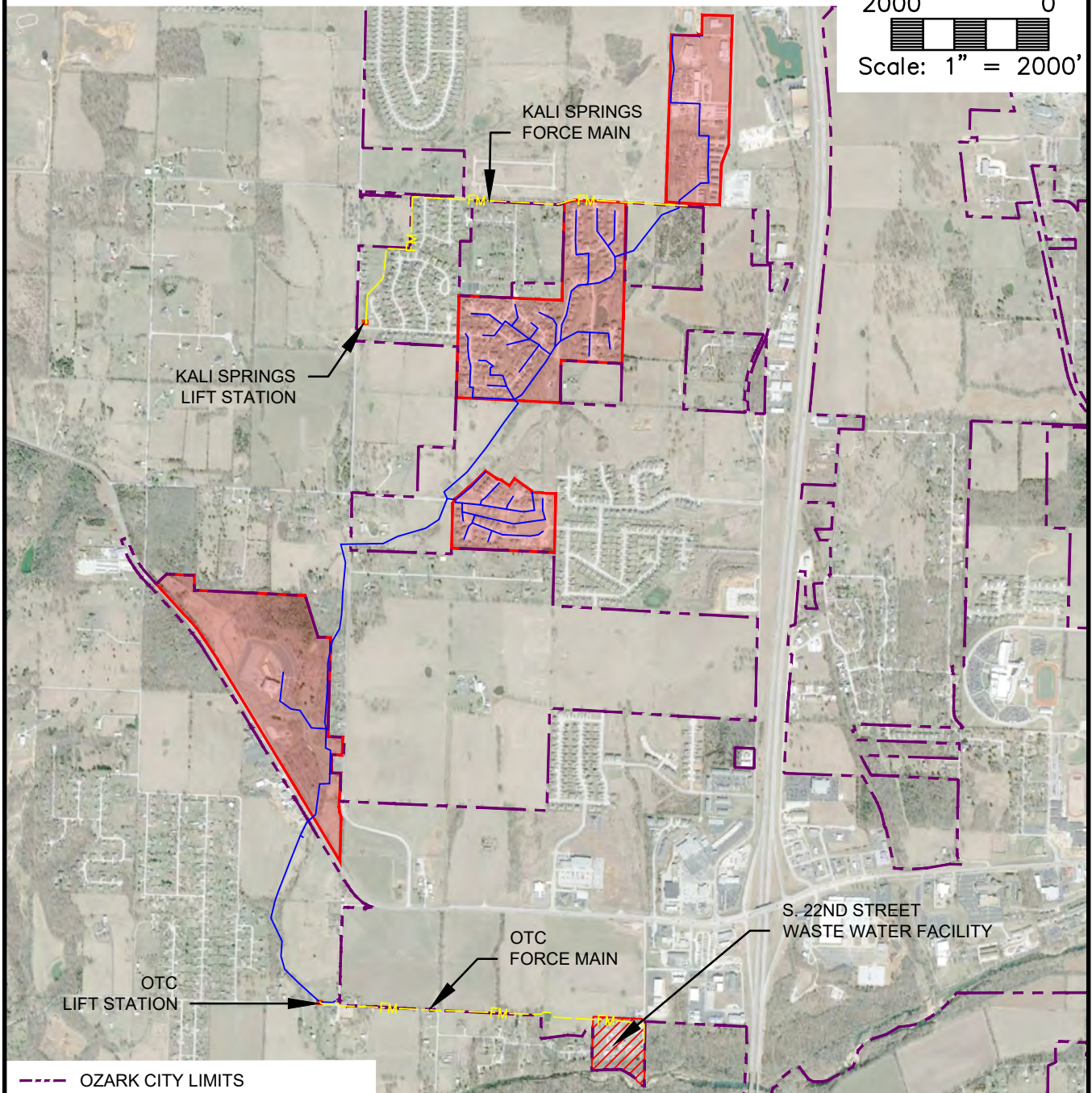
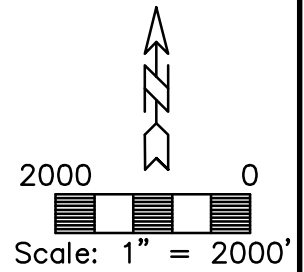
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- Architecture
- Site Development
- General Consulting
- Master Planning

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DATE
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PROJ. NO.
SW18-130

EXISTING PUBLIC SANITARY SEWER SYSTEM TO OTC LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
292 Residential, 13 Non-Residential
- Kali Springs Lift Station
39,161 GPD



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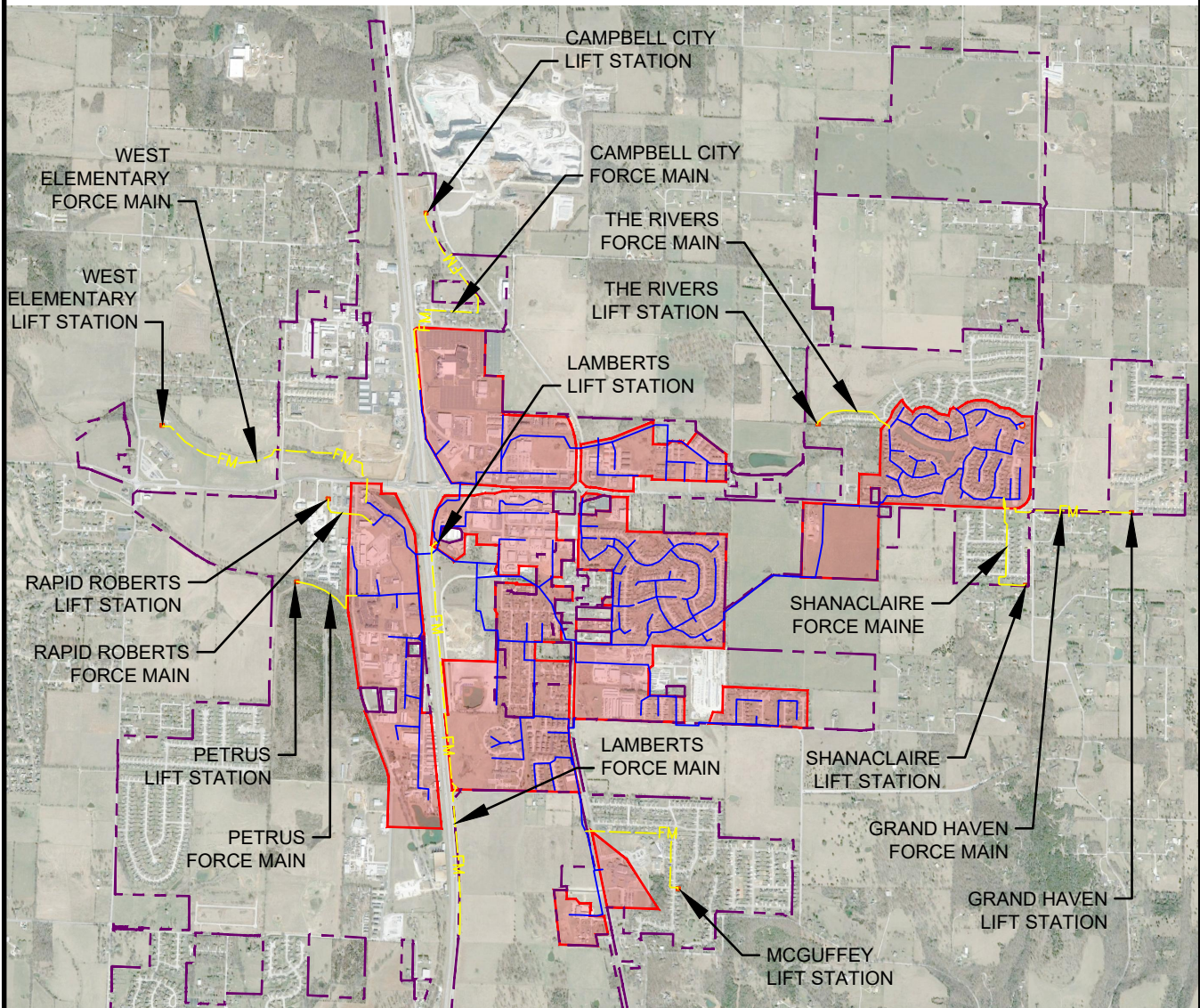
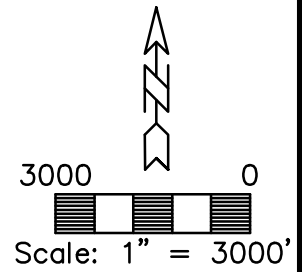
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- Master Planning

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CLD

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5-3-18

PROJ. NO.
SW18-130

EXISTING PUBLIC SANITARY SEWER SYSTEM TO LAMBERTS LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
1,643 Residential, 170 Non-Residential
- Campbell City Lift Station
13,818 GPD
- Grand Haven Lift Station
17,422 GPD

- McGuffey Lift Station
43,095 GPD
- Petrus City Lift Station
27,988 GPD
- Rapid Roberts Lift Station
16,368 GPD
- The Rivers Lift Station
34,387 GPD
- Shanaclaire Lift Station
16,037 GPD
- West Elementary Lift Station
13,050 GPD



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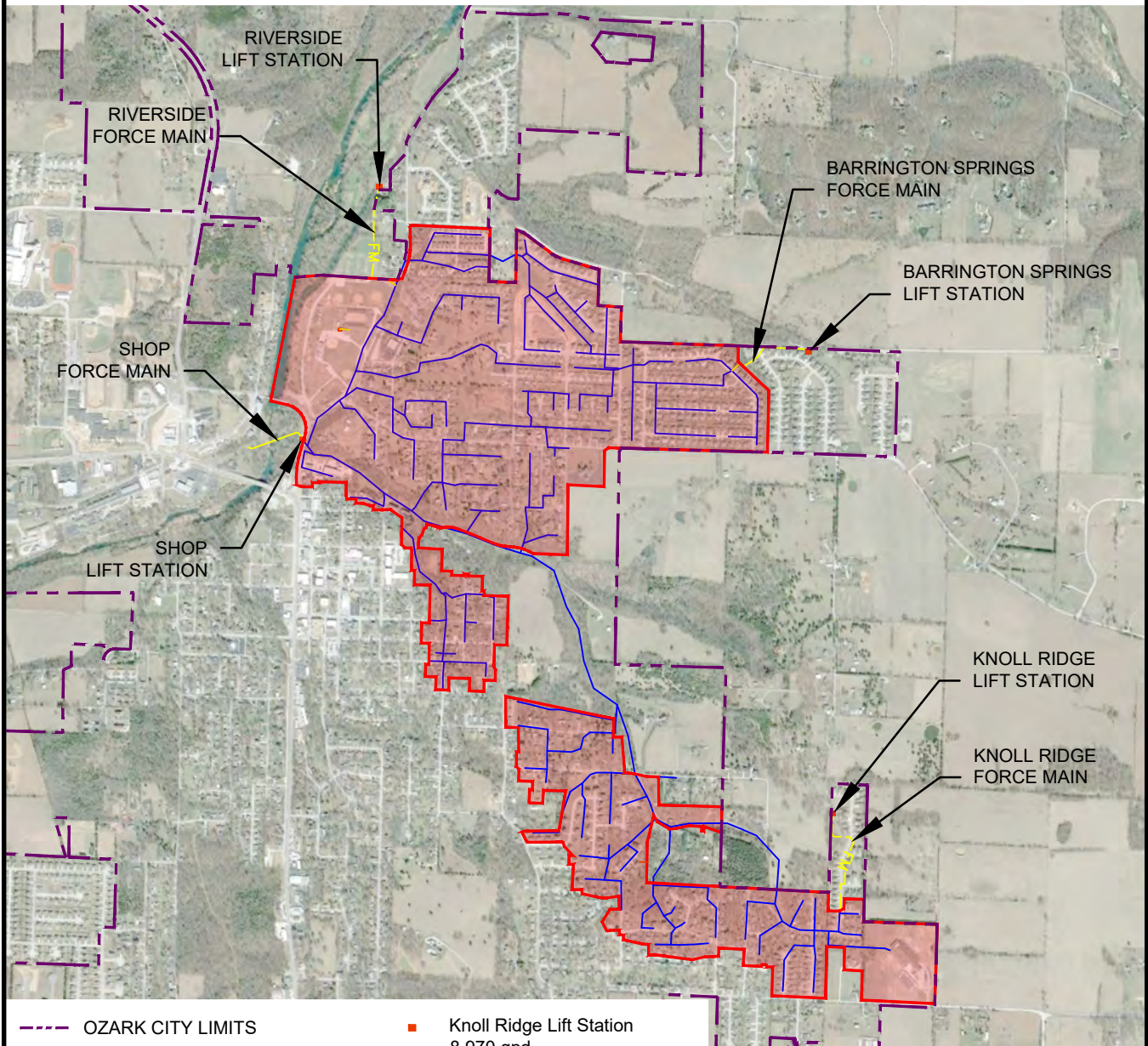
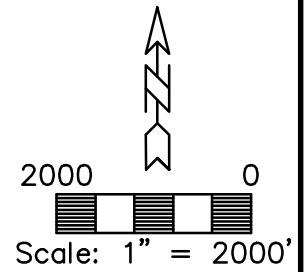
- Civil Engineering
- Land Surveying
- Architecture
- Site Development
- General Consulting
- Master Planning

DWN. BY
CLD

DATE
5-3-18

PROJ. NO.
SW18-130

EXISTING PUBLIC SANITARY SEWER SYSTEM TO SHOP LIFT STATION



- OZARK CITY LIMITS
- EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
918 Residential, 21 Non-Residential
- Knoll Ridge Lift Station
8,970 gpd
- Riverside Lift Station
13,230 gpd
- Barrington Springs Lift Station
16,178 gpd



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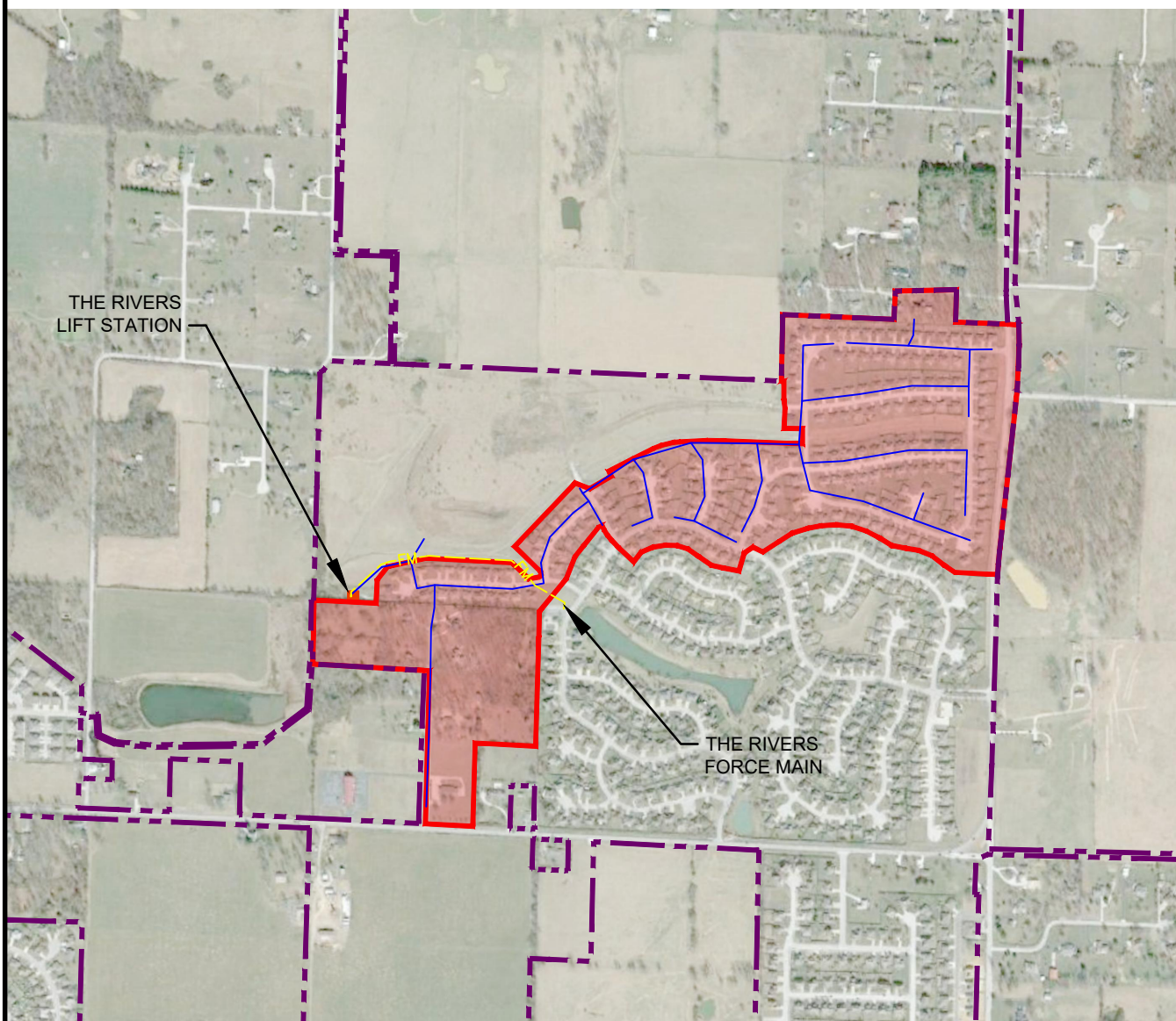
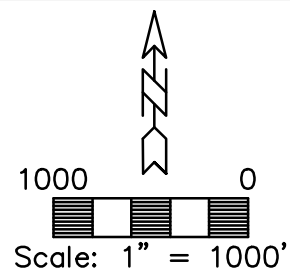
- Civil Engineering
- Land Surveying
- Architecture
- Site Development
- General Consulting
- Master Planning

DWN. BY
CLD

DATE
5-3-18

PROJ. NO.
SW18-130

EXISTING PUBLIC SANITARY SEWER SYSTEM TO THE RIVERS LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
210 Residential, 1 Non-Residential



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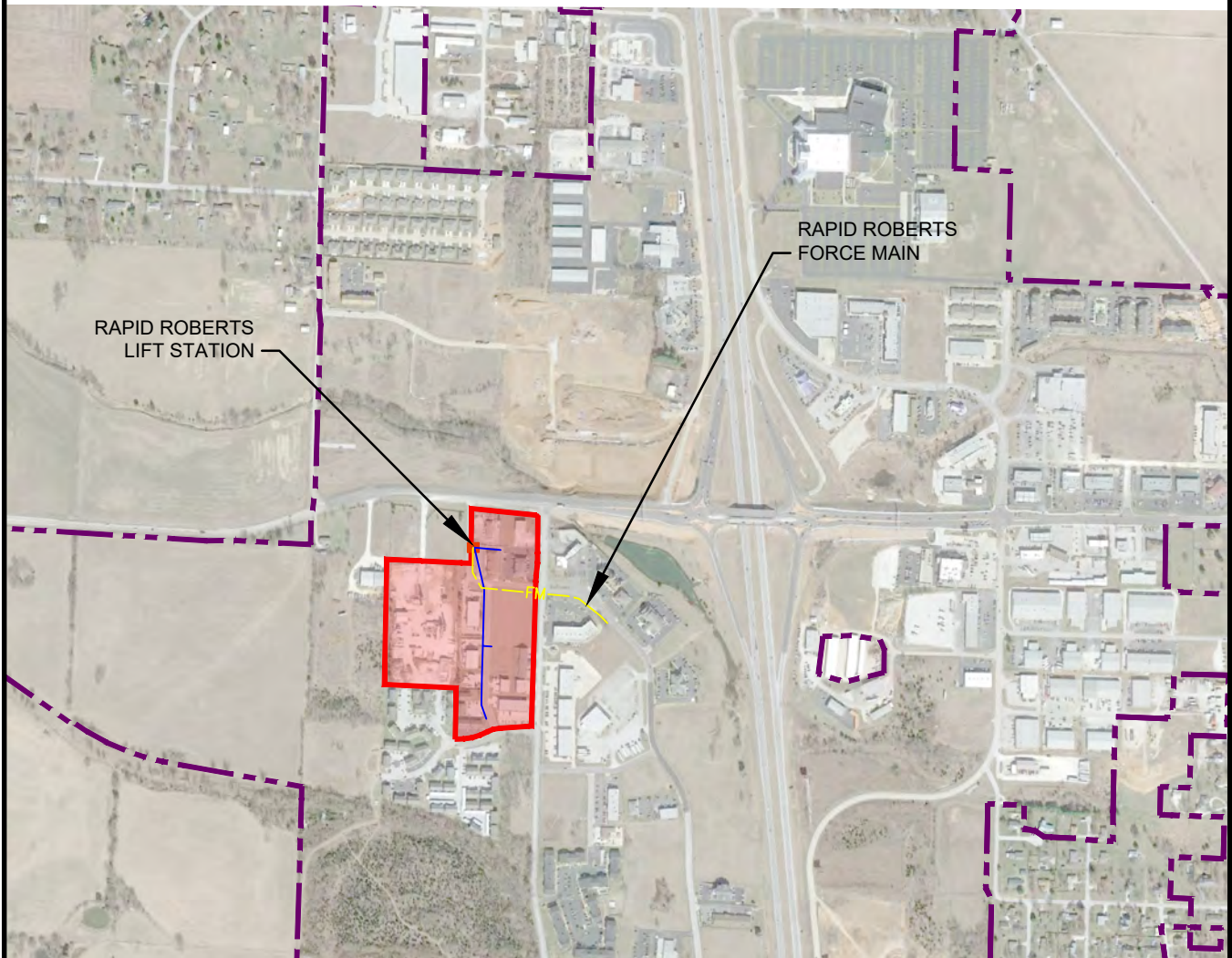
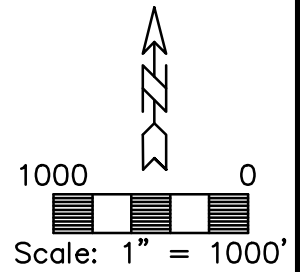
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- Architecture
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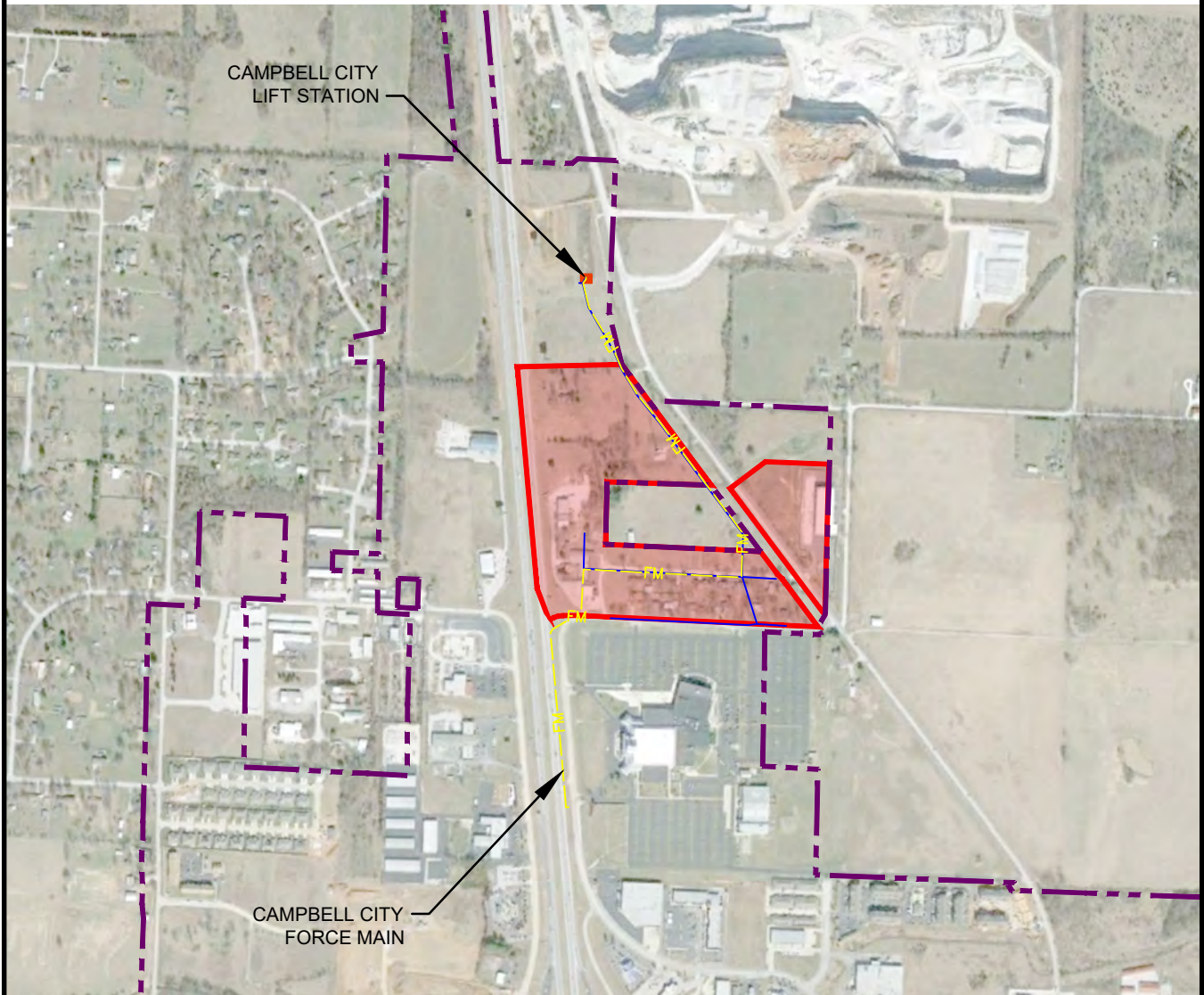
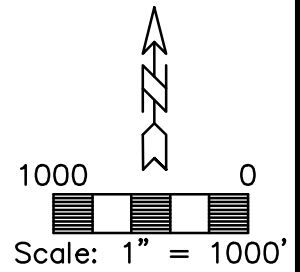
EXISTING PUBLIC SANITARY SEWER SYSTEM TO RAPID ROBERTS LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
15 Residential, 11 Non-Residential

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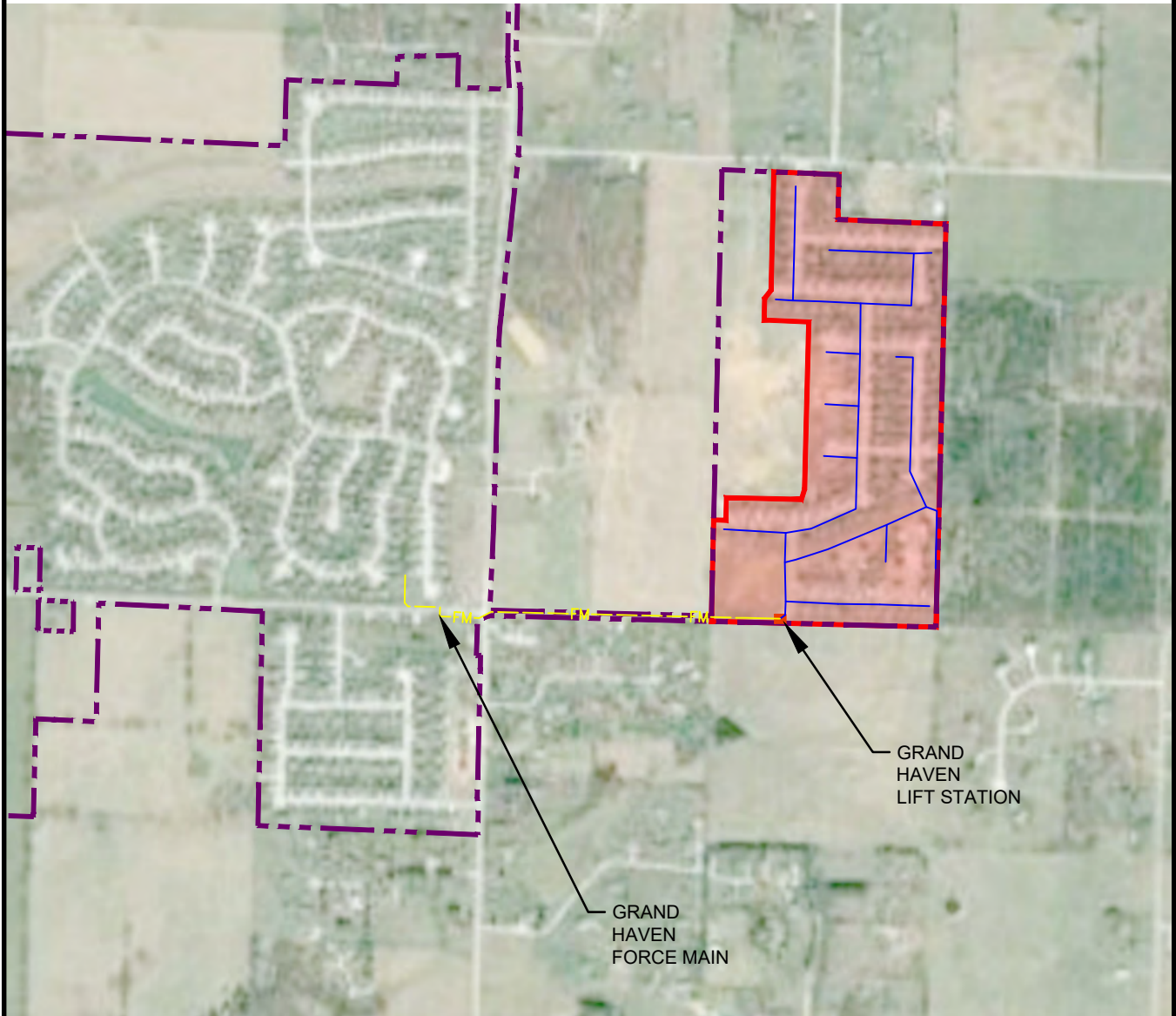
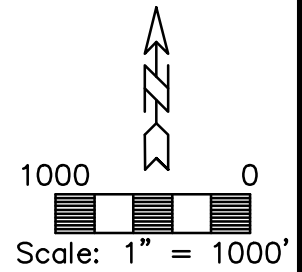
EXISTING PUBLIC SANITARY SEWER SYSTEM TO CAMPBELL CITY LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
20 Residential, 4 Non-Residential

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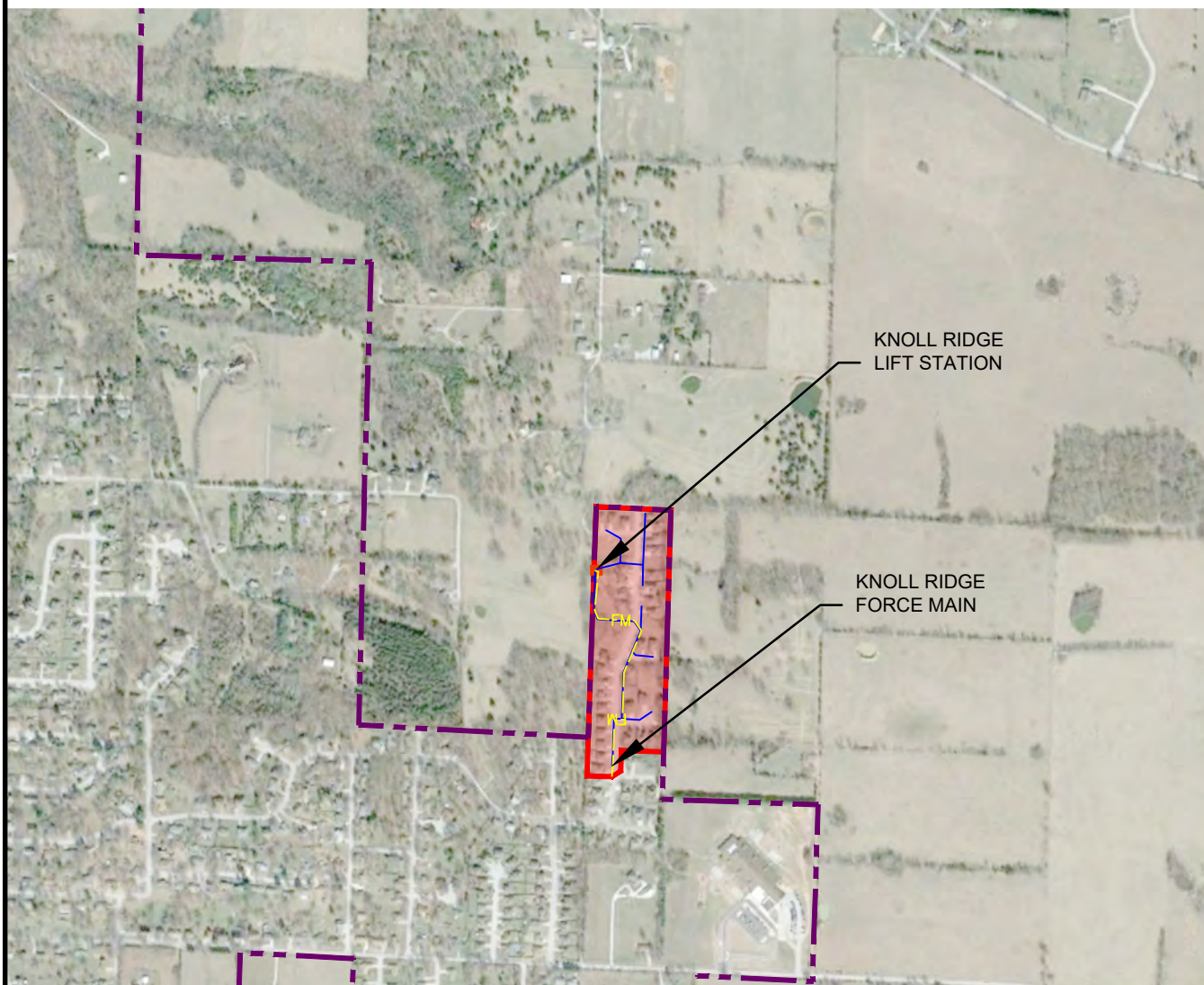
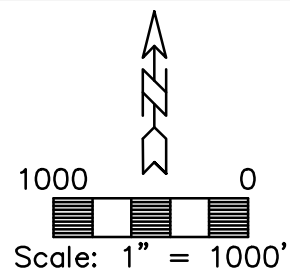
EXISTING PUBLIC SANITARY SEWER SYSTEM TO GRAND HAVEN LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
141 Residential, 0 Non-Residential

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EXISTING PUBLIC SANITARY SEWER SYSTEM TO KNOLL RIDGE LIFT STATION



--- OZARK CITY LIMITS

—FM— EXISTING FORCE MAIN

— EXISTING SANITARY
SEWER MAIN

Existing Tributary Areas -
33 Residential, 0 Non-Residential



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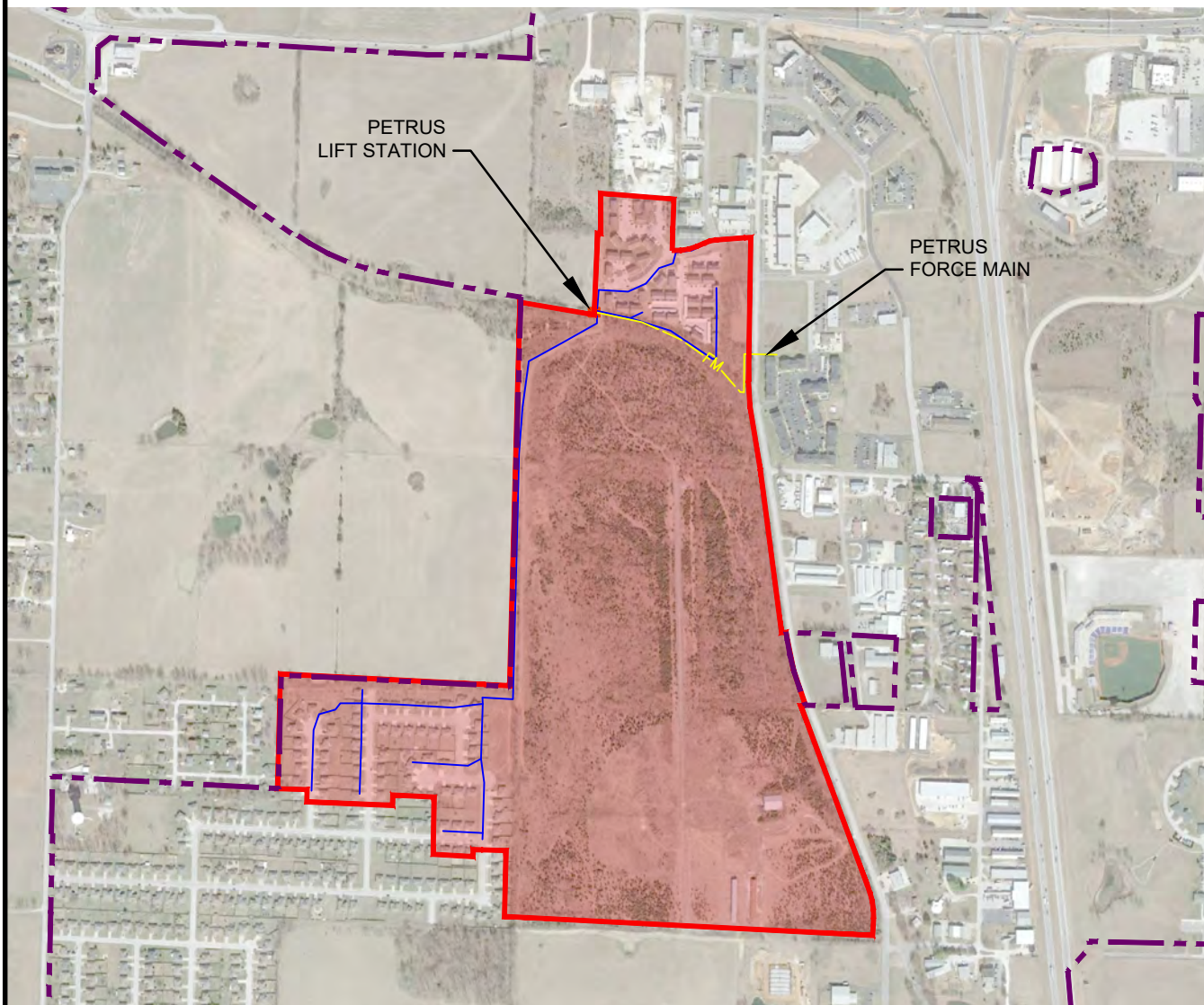
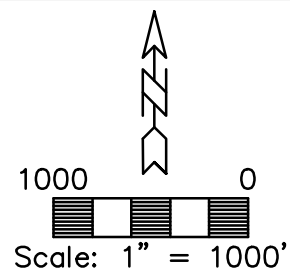
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- Architecture
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EXISTING PUBLIC SANITARY SEWER SYSTEM TO PETRUS LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
211 Residential, 3 Non-Residential



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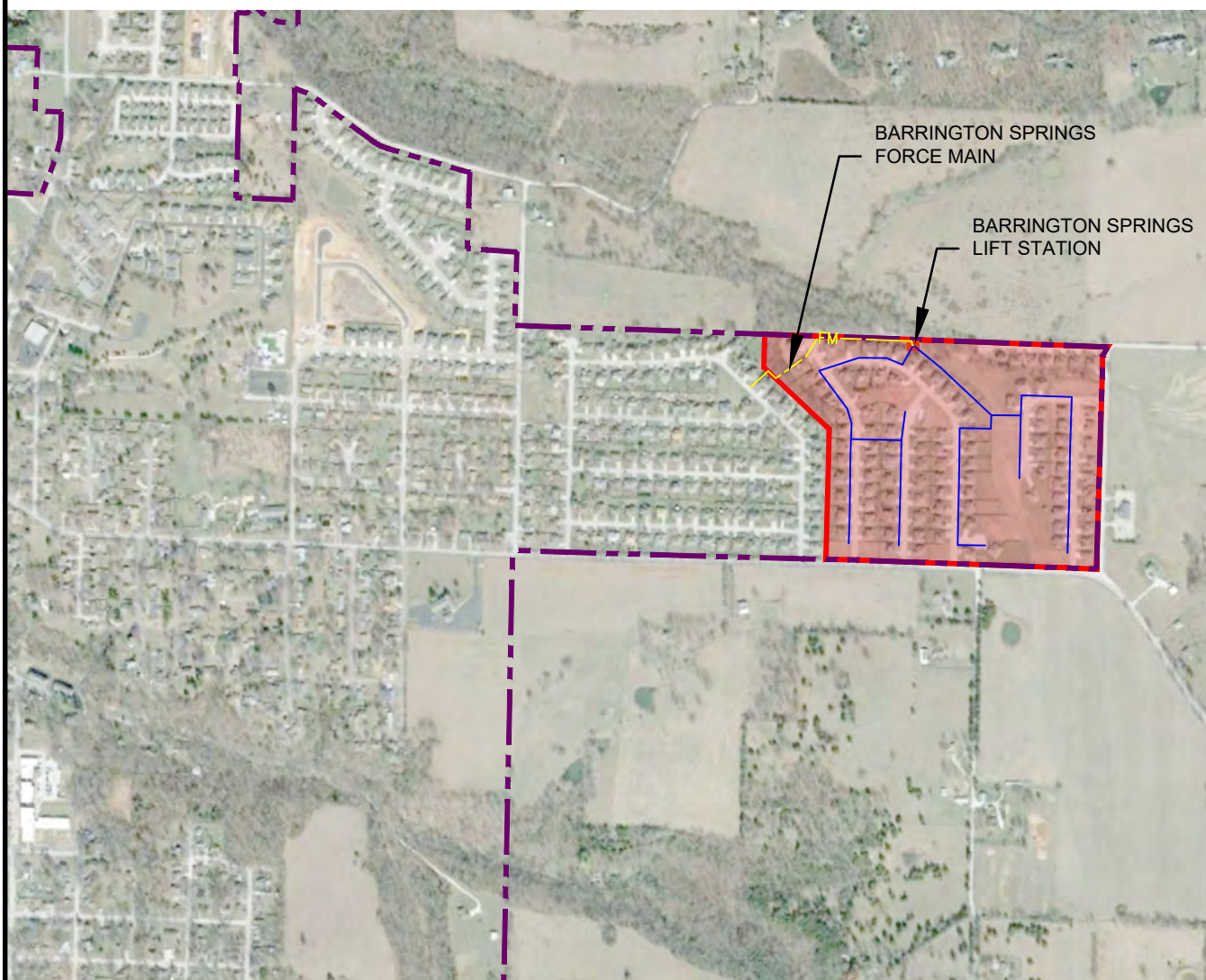
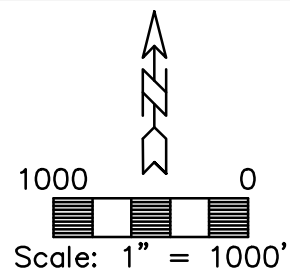
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PROJ. NO.
SW18-130

EXISTING PUBLIC SANITARY SEWER SYSTEM TO BARRINGTON SPRINGS LIFT STATION



--- OZARK CITY LIMITS

—FM— EXISTING FORCE MAIN

— EXISTING SANITARY
SEWER MAIN

Existing Tributary Areas -
113 Residential, 0 Non-Residential



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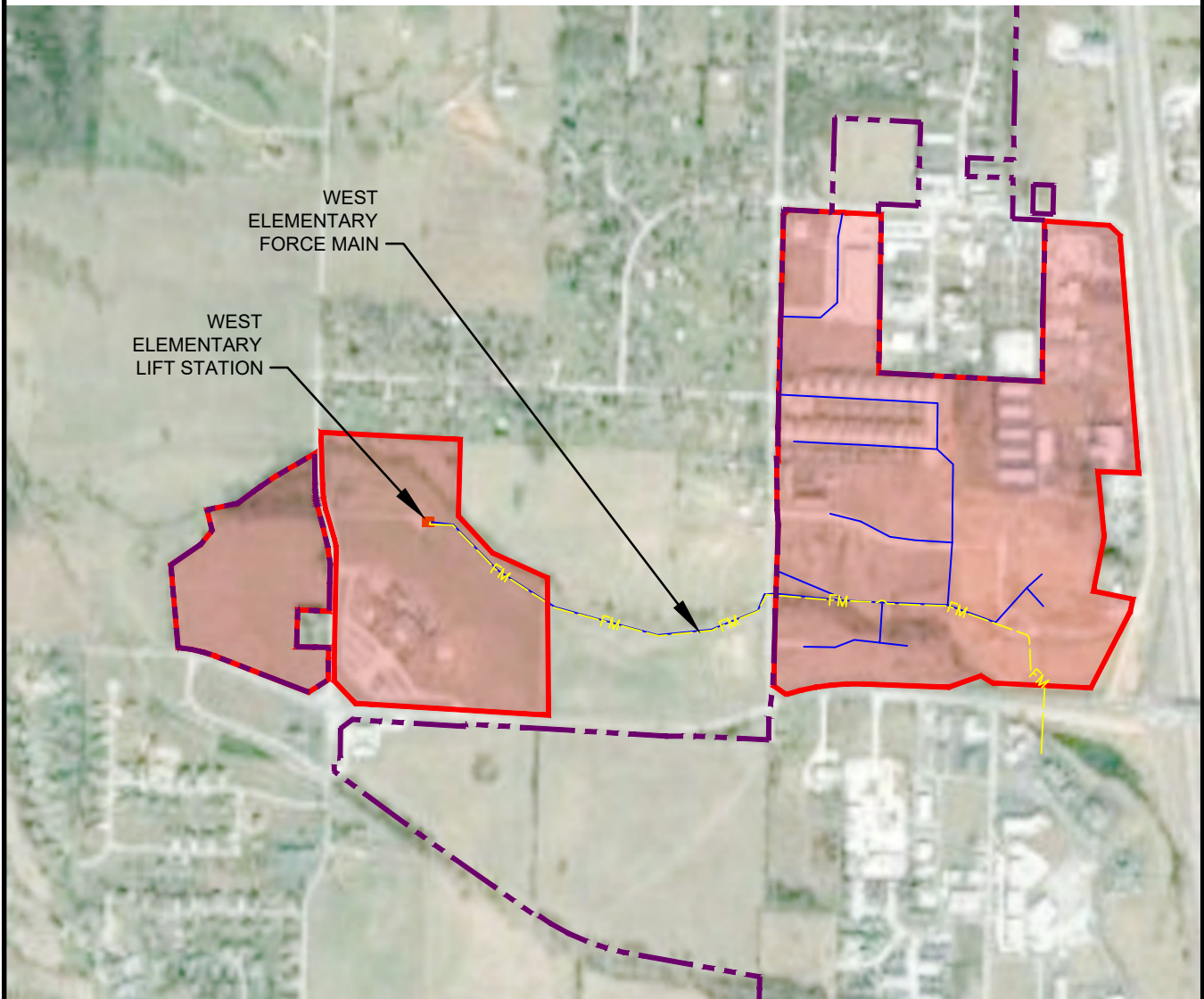
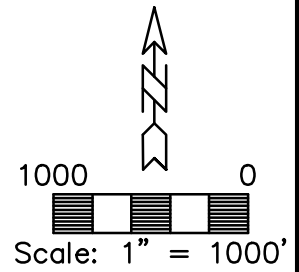
- Civil Engineering
- Land Surveying
- Architecture
- Site Development
- General Consulting
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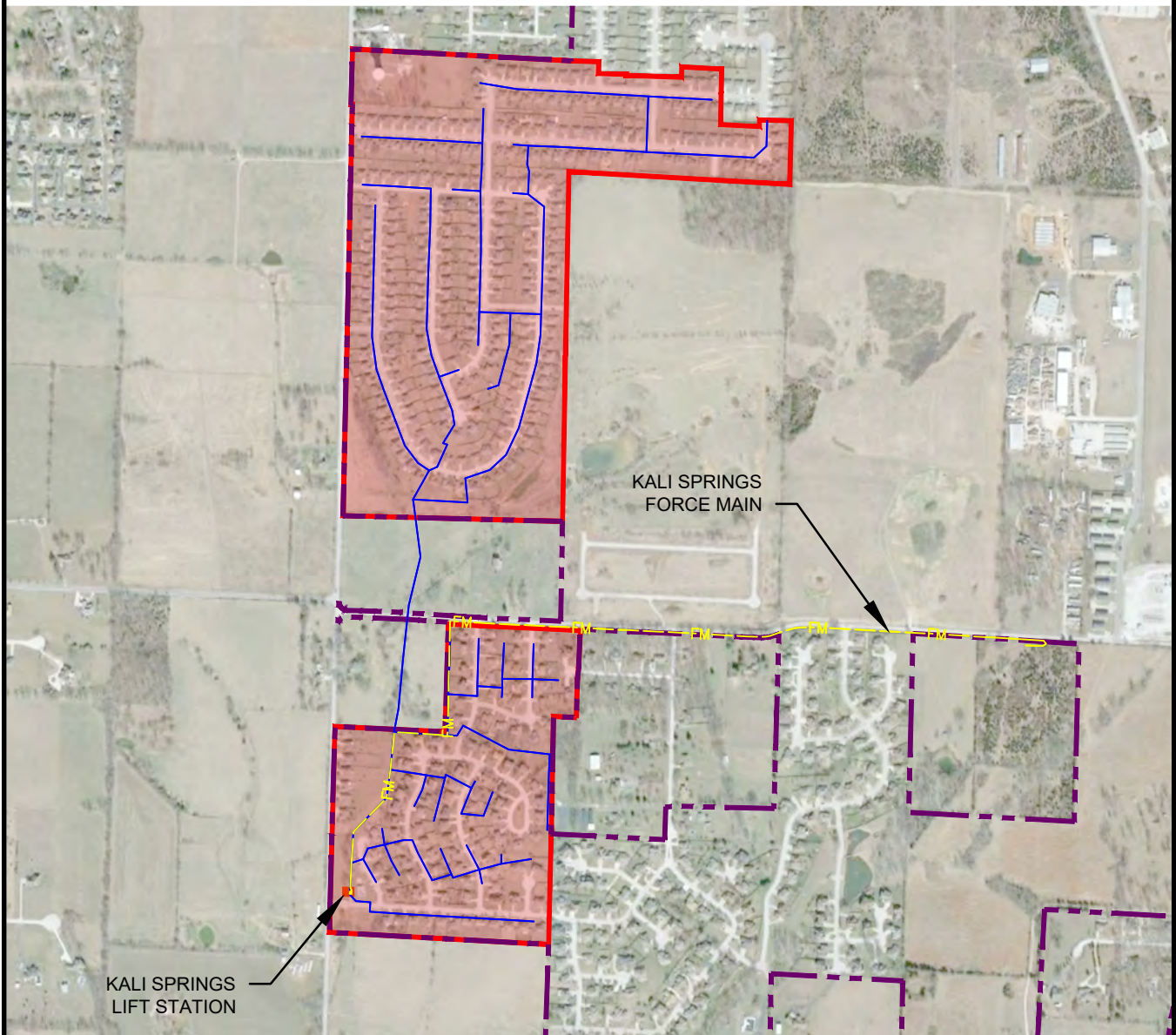
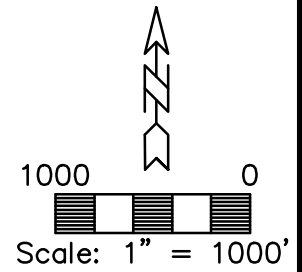
EXISTING PUBLIC SANITARY SEWER SYSTEM TO WEST ELEMENTARY LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
110 Residential, 23 Non-Residential

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EXISTING PUBLIC SANITARY SEWER SYSTEM TO KALI SPRINGS LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY
SEWER MAIN
- Existing Tributary Areas -
389 Residential, 0 Non-Residential



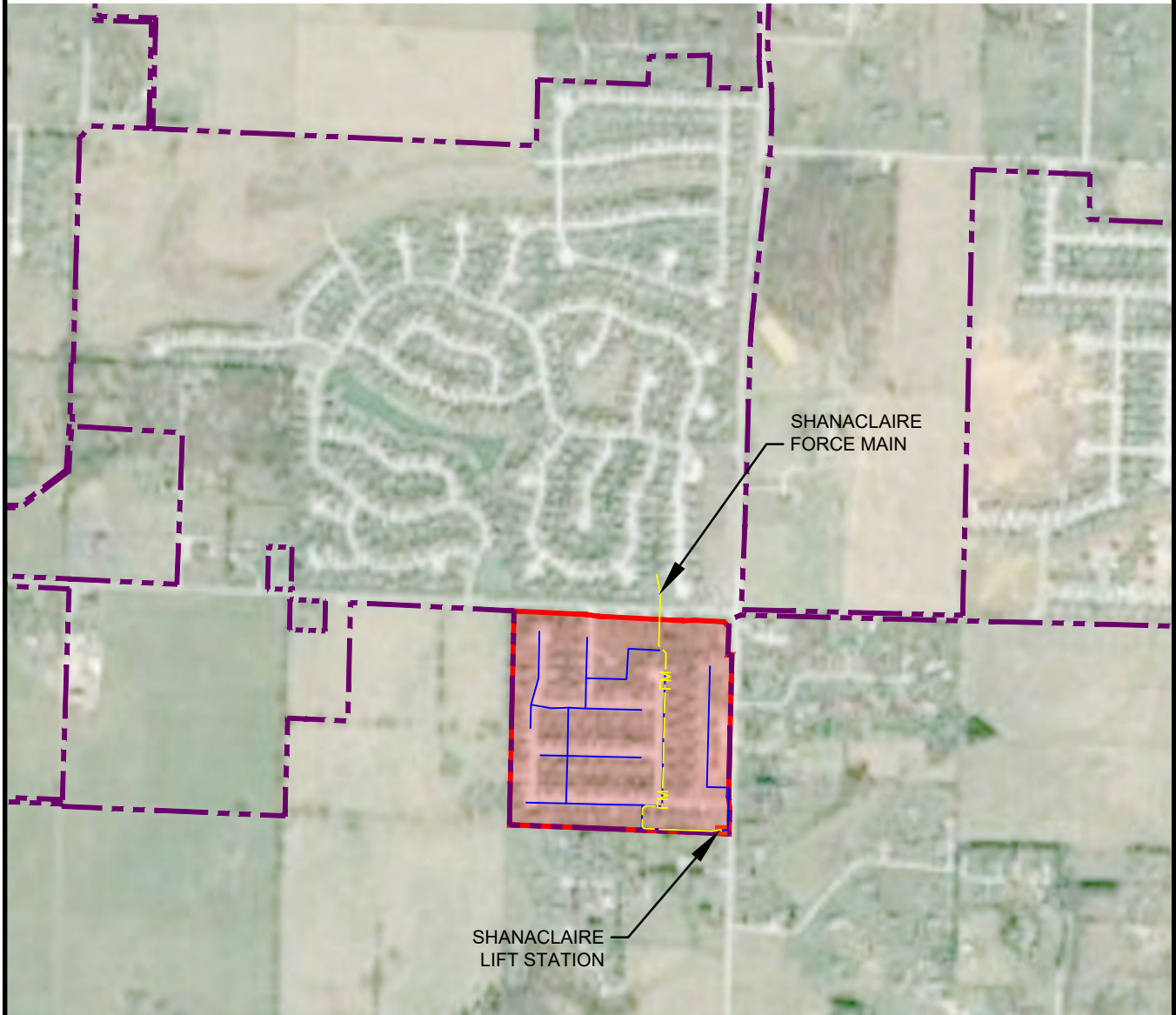
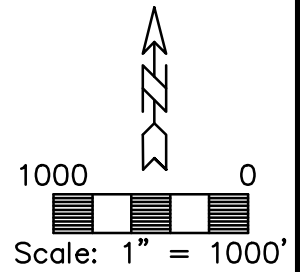
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EXISTING PUBLIC SANITARY SEWER SYSTEM TO SHANACLAIRE LIFT STATION



--- OZARK CITY LIMITS

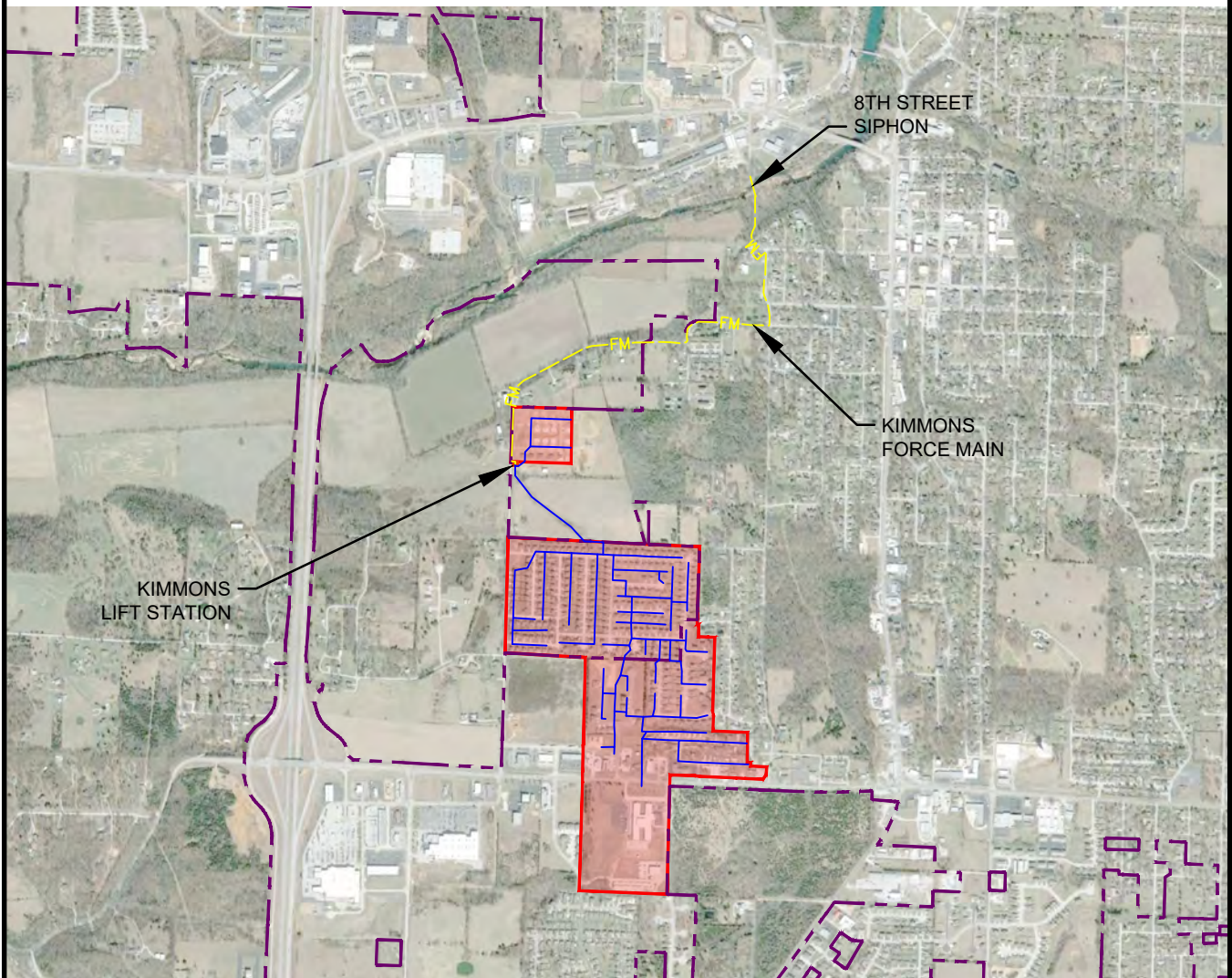
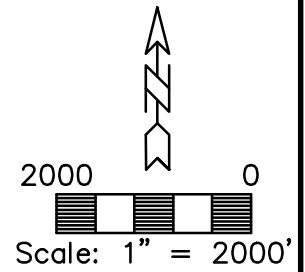
—FM— EXISTING FORCE MAIN

— EXISTING SANITARY
SEWER MAIN

Existing Tributary Areas -
98 Residential, 0 Non-Residential

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EXISTING PUBLIC SANITARY SEWER SYSTEM TO KIMMONS LIFT STATION



--- OZARK CITY LIMITS

—FM— EXISTING FORCE MAIN

— EXISTING SANITARY
SEWER MAIN

Existing Tributary Areas -
341 Residential, 14 Non-Residential



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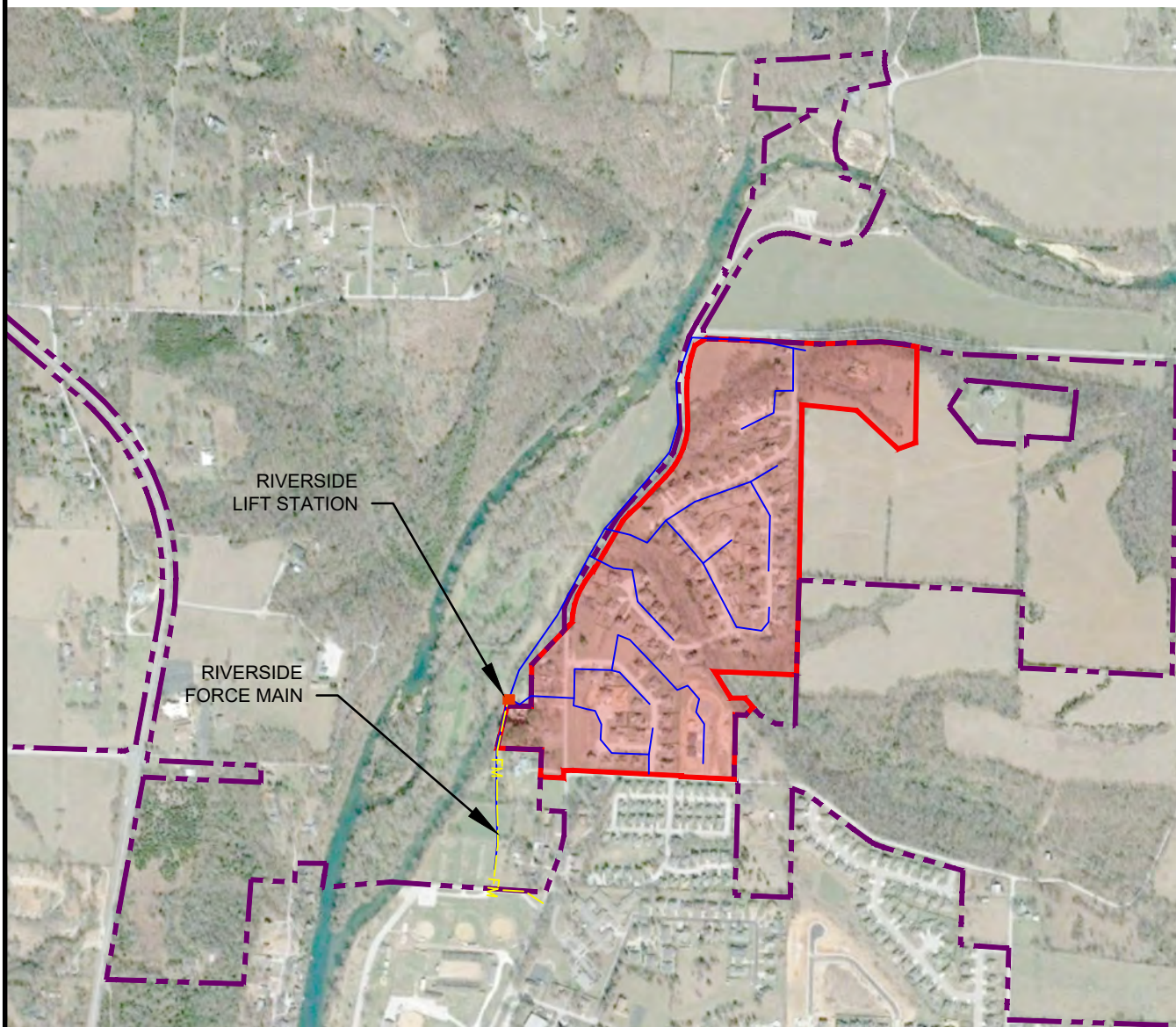
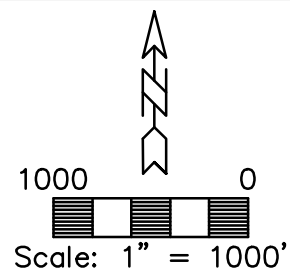
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- Architecture
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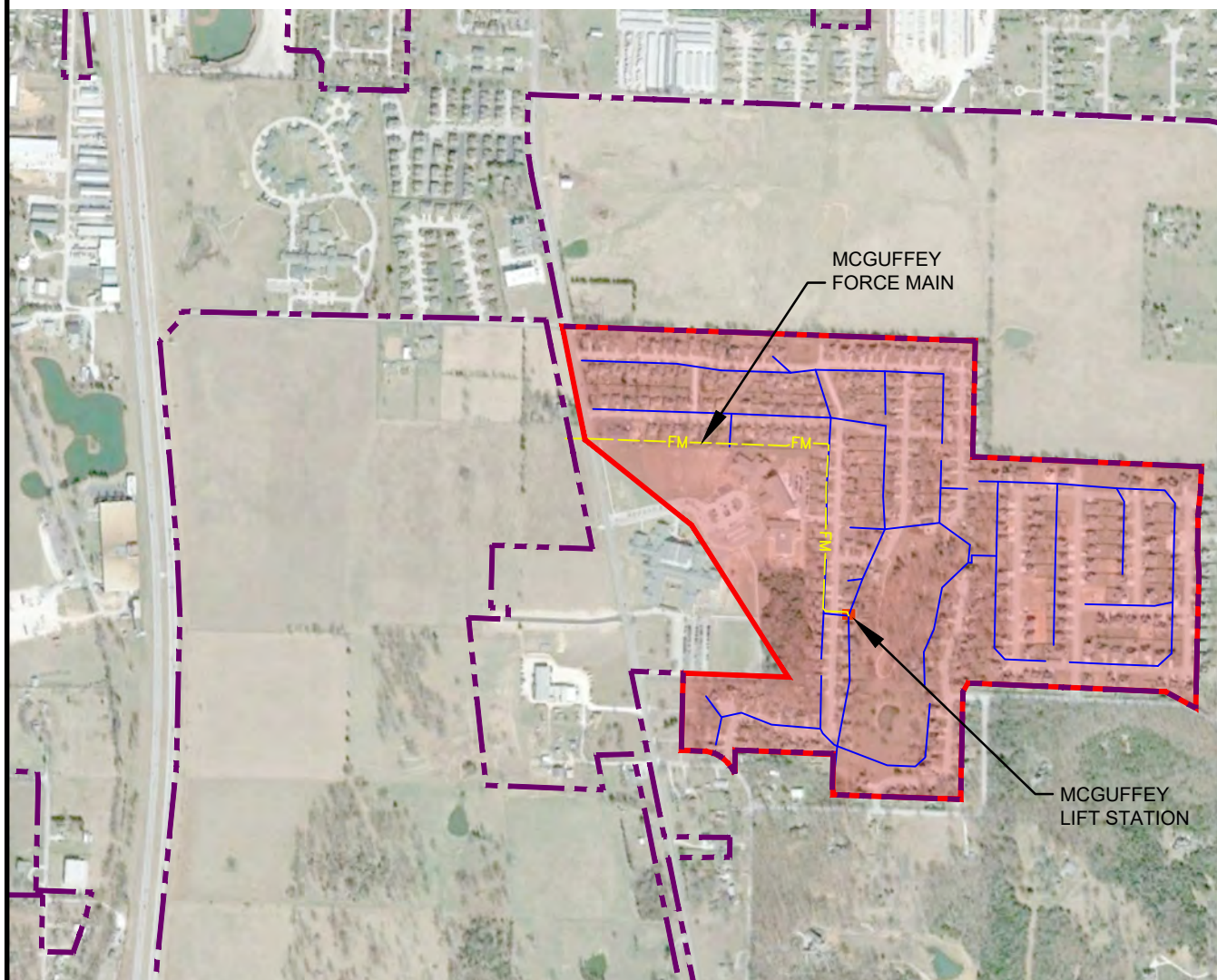
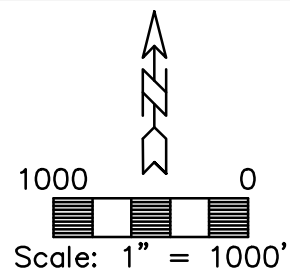
EXISTING PUBLIC SANITARY SEWER SYSTEM TO RIVERSIDE LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
93 Residential, 0 Non-Residential

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EXISTING PUBLIC SANITARY SEWER SYSTEM TO MCGUFFEY LIFT STATION



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY
SEWER MAIN
- Existing Tributary Areas -
307 Residential, 4 Non-Residential



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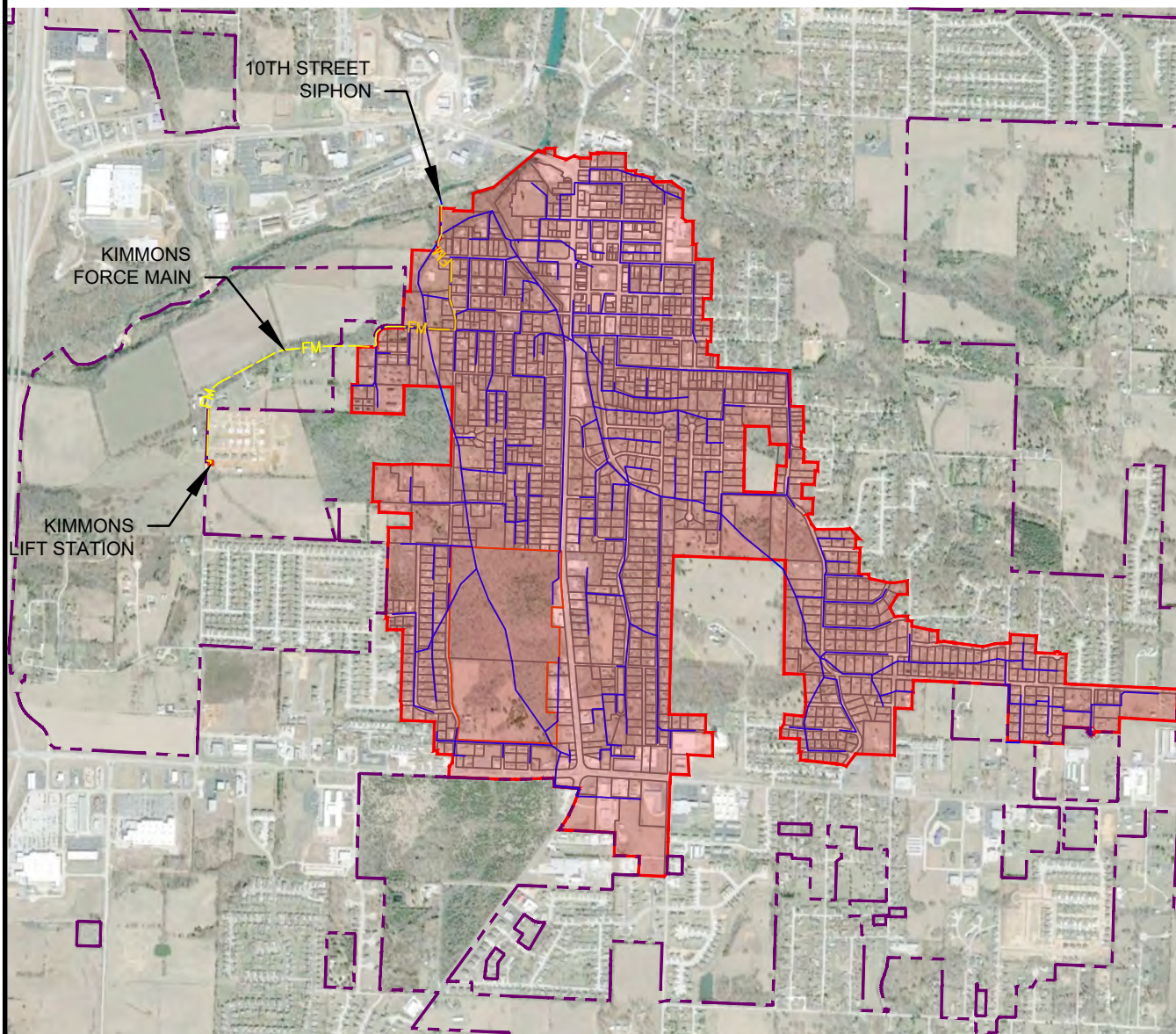
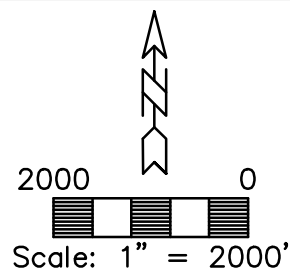
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- Architecture
- Site Development
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- Master Planning

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5-3-18

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EXISTING PUBLIC SANITARY SEWER SYSTEM TO 10TH STREET SIPHON



- OZARK CITY LIMITS
- FM— EXISTING FORCE MAIN
- EXISTING SANITARY SEWER MAIN
- Existing Tributary Areas -
1,067 Residential, 142 Non-Residential
- Kimmons Lift Station
25,338 GPD



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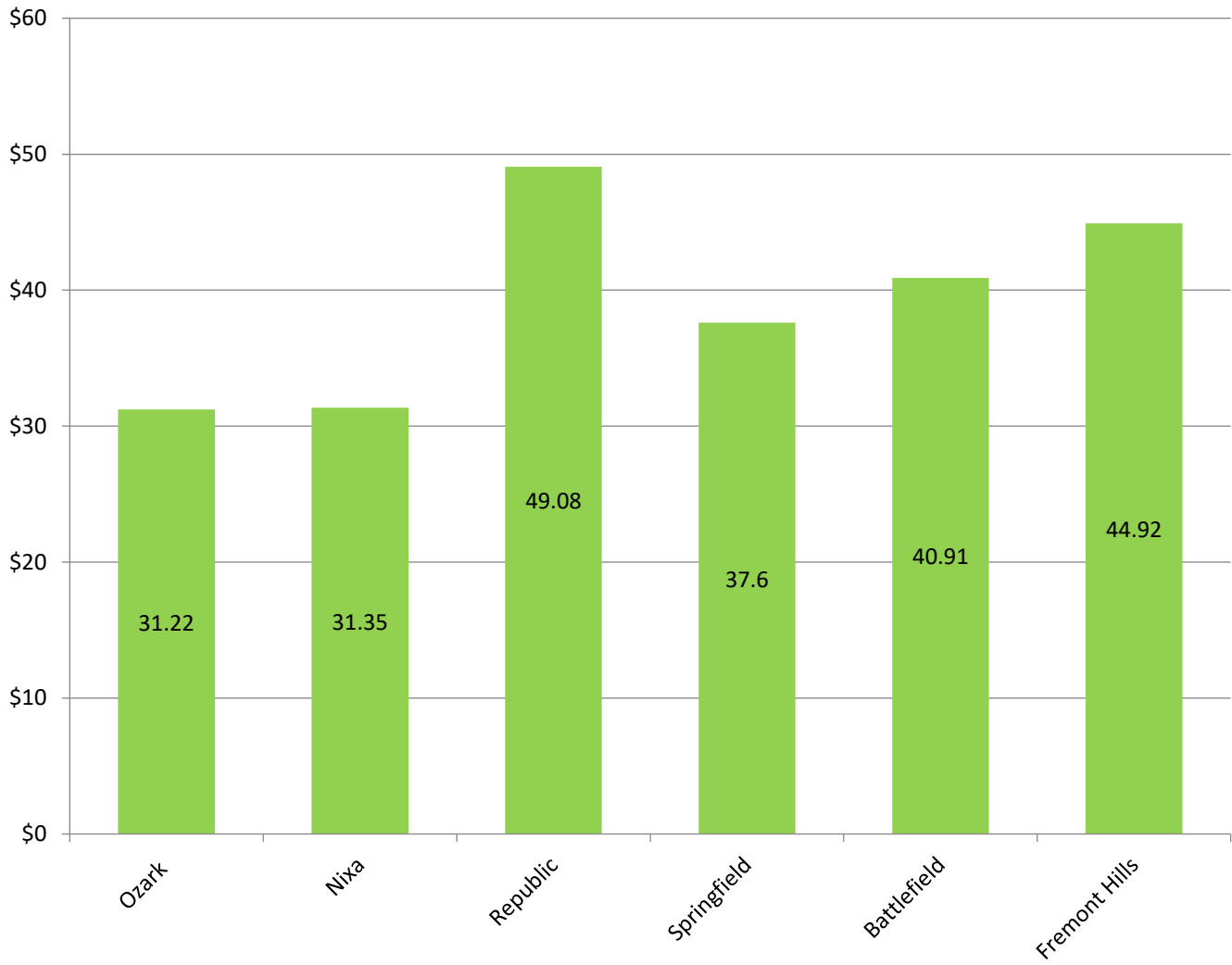
PROJ. NO.
SW18-130

APPENDIX Q
RESIDENTIAL SEWER RATES OF SURROUNDING CITIES

DRAFT

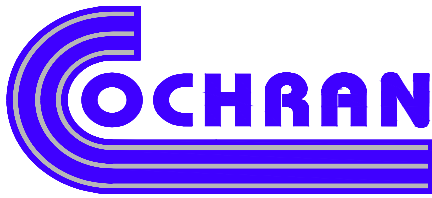
Residential Sewer Rates of Surrounding Cities

(Monthly bill based on 5,000 gal usage)



APPENDIX R
CAPITAL IMPROVEMENT PRELIMINARY COST ESTIMATES

DRAFT



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**R-1 PRELIMINARY COST ESTIMATE
INFLOW AND INFILTRATION PROJECT
10-YEAR PROGRAM
OZARK, MO
FEBRUARY 8, 2019**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
6-Inch Diameter Cured In-Place Pipe	1,164	LF	\$28.00	\$32,592.00
8-Inch Diameter Cured In-Place Pipe	71,161	LF	\$23.00	\$1,636,703.00
10-Inch Diameter Cured In-Place Pipe	7,991	LF	\$28.00	\$223,748.00
Laterals Reconnected	583	EA	\$100.00	\$58,300.00
Cementitious/Epoxy Lining of Manholes*	2,632	VF	\$135.00	\$355,320.00
Traffic Control	1	LS	\$25,000.00	\$25,000.00
Total Construction Cost				\$2,331,663.00
Contingencies (15%)				\$349,749.45
Design/Inspection Fees				\$200,000.00
GRAND TOTAL				<u>\$2,881,412.45</u>

*Assumes manholes at an average depth of (7') seven feet.

**Cost Estimate assumes project will be completed in phases.

***Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

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Wentzville, MO 63385
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Fax: 636-327-0760

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Fenton, MO 63026
Phone: 314-842-4033
Fax: 314-842-5957

530A East Independence Drive
Union, MO 63084
Phone: 636-584-0540
Fax: 636-584-0512

534 Maple Valley Drive
Farmington, MO 63640
Phone: 573-315-4810
Fax: 573-315-4811

2804 North Biagio Street
Ozark, MO 65721
Phone: 417-595-4108
Fax: 417-595-4109

905 Executive Drive
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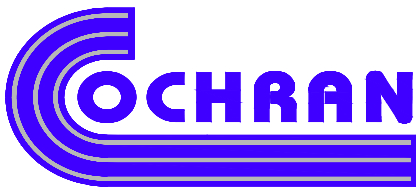
**R-2 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
NORTH PLANT CLARIFIER RETURN STRUCTURES - SLUDGE RETURN
VALVES OZARK, MO
APRIL 17, 2019**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
General Conditions/Mobilization	1	LS	\$7,500.00	\$7,500.00
Remove Hatch	1	LS	\$500.00	\$500.00
Remove Power Actuators	1	LS	\$500.00	\$500.00
Install Perimeter Bar Grating Angle	25	LF	\$20.00	\$500.00
Install Bar Grating	36	SF	\$25.00	\$900.00
Floor Stand Operator	1	LS	\$4,000.00	\$4,000.00
Modify Existing Knife Valve Operator to Work With Floor Stand	1	LS	\$1,500.00	\$1,500.00
Grout Base to Create Sump Pit	1	LS	\$1,500.00	\$1,500.00
Sump Pump	1	LS	\$250.00	\$250.00
Sump Pump Discharge Piping	1	LS	\$500.00	\$500.00
Modify Electric for Pump	1.0	LS	\$1,000.00	\$1,000.00
Subtotal				\$18,650.00
Contingencies (15%)				\$2,797.50
Design/Inspection Fees (15%)				\$2,797.50
GRAND TOTAL				<u>\$24,245.00</u>

*Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

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**R-3 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
NORTH PLANT CLARIFIER RETURN STRUCTURES - TELESCOPING VALVE
OZARK, MO
APRIL 17, 2019**

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>UNIT COST</u>	<u>TOTAL</u>
General Conditions/Mobilization	1	LS	\$5,000.00	\$5,000.00
Install Perimeter Angle	1	LS	\$500.00	\$500.00
Install 3/4-Inch Steel Plate	1	LS	\$1,000.00	\$1,000.00
Install 90° Bend on Plate	1	LS	\$1,000.00	\$1,000.00
Telescoping Valve	1	LS	\$5,000.00	\$5,000.00
Subtotal				\$12,500.00
Contingencies (15%)				\$1,875.00
Design/Inspection Fees (15%)				\$1,875.00
GRAND TOTAL				<u><u>\$16,250.00</u></u>

*Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

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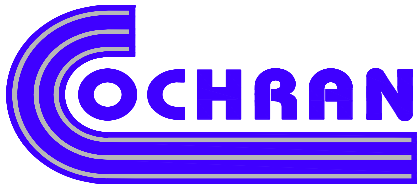
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**R-4 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
NORTH PLANT CLARIFIER #3 AND #4
OZARK, MO
DECEMBER 15, 2020**

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>UNIT COST</u>	<u>TOTAL</u>
General Conditions/Mobilization	1	LS	\$30,000.00	\$30,000.00
Demolition and Haul Off	1	LS	\$20,000.00	\$20,000.00
Purchase New Equipment	1	LS	\$270,000.00	\$270,000.00
Install New Equipment	1	LS	\$230,000.00	\$230,000.00
Subtotal				\$550,000.00
Contingencies (15%)				\$82,500.00
Design/Inspection Fees (10%)				\$55,000.00
GRAND TOTAL				<u>\$687,500.00</u>

8 East Main Street Wentzville, MO 63385 Phone: 636-332-4574 Fax: 636-327-0760	737 Rudder Road Fenton, MO 63026 Phone: 314-842-4033 Fax: 314-842-5957	530A East Independence Drive Union, MO 63084 Phone: 636-584-0540 Fax: 636-584-0512	534 Maple Valley Drive Farmington, MO 63640 Phone: 573-315-4810 Fax: 573-315-4811	2804 North Biagio Street Ozark, MO 65721 Phone: 417-595-4108 Fax: 417-595-4109	905 Executive Drive Osage Beach, MO 65065 Phone: 573-525-0299 Fax: 573-525-0298
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**R-5 PRELIMINARY COST ESTIMATE SANITARY
SEWER IMPROVEMENTS
NORTH PLANT GRIT REMOVAL REHABILITATION
OZARK MO
DECEMBER 15, 2020**

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>UNIT COST</u>	<u>TOTAL</u>
General Conditions/Mobilization	1	LS	\$15,000.00	\$15,000.00
Rehabilitation Improvements	1	LS	\$285,000.00	\$285,000.00
Subtotal				\$300,000.00
Contingencies (15%)				\$45,000.00
Design/Inspection Fees (10%)				\$30,000.00
GRAND TOTAL				<u><u>\$375,000.00</u></u>

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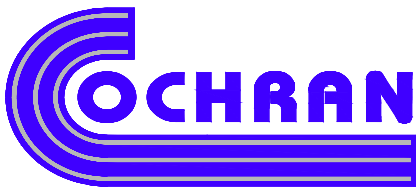
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Fax: 636-584-0512

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Phone: 573-315-4810
Fax: 573-315-4811

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**R-6 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
NORTH PLANT GENERATOR
OZARK, MO
APRIL 17, 2019**

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>UNIT COST</u>	<u>TOTAL</u>
General Conditions/Mobilization	1	LS	\$15,000.00	\$15,000.00
Concrete Pad	1	LS	\$2,500.00	\$2,500.00
Double Throw Switch	1	LS	\$35,000.00	\$35,000.00
(4) 4-Inch Conduits w/ (3) 250 MCM Cables	1	LS	\$10,000.00	\$10,000.00
750KW Generator	1	LS	\$200,000.00	\$200,000.00
Electrician Field Work	1	LS	\$10,000.00	\$10,000.00
Subtotal				\$272,500.00
Contingencies (15%)				\$40,875.00
Design/Inspection Fees (10%)				\$27,250.00
GRAND TOTAL				<u>\$340,625.00</u>

*Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

8 East Main Street	737 Rudder Road	530A East Independence Drive	534 Maple Valley Drive	2804 North Biagio Street	905 Executive Drive
Wentzville, MO 63385	Fenton, MO 63026	Union, MO 63084	Farmington, MO 63640	Ozark, MO 65721	Osage Beach, MO 65065
Phone: 636-332-4574	Phone: 314-842-4033	Phone: 636-584-0540	Phone: 573-315-4810	Phone: 417-595-4108	Phone: 573-525-0299
Fax: 636-327-0760	Fax: 314-842-5957	Fax: 636-584-0512	Fax: 573-315-4811	Fax: 417-595-4109	Fax: 573-525-0298

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**R-7 PRELIMINARY COST ESTIMATE
SEWER MAIN EXTENSION
FREMONT ROAD GRAVITY SEWER TRUNK MAIN
OZARK, MO
FEBRUARY 8, 2019**

Phase I

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$50,000.00	\$50,000.00
18-Inch Diameter SDR 35 PVC Sanitary Sewer Main (Open-Cut Trench Installation)	2,838	LS	\$70.00	\$198,660.00
18-Inch Diameter SDR 21 Class 200 Restrained Joint PVC Sanitary Sewer Main, Through Encasement	170	LF	\$150.00	\$25,500.00
24-Inch Steel Encasement - Simultaneously Bored and Installed Under West Trevor Trail	65	LF	\$550.00	\$35,750.00
24-Inch Steel Encasement - Simultaneously Bored and Installed Under Fremont Road	55	LF	\$550.00	\$30,250.00
24-Inch Steel Encasement - Simultaneously Bored and Installed Under Richwood Road	50	LF	\$550.00	\$27,500.00
48-Inch I.D. Sanitary Sewer Manhole	11	EA	\$3,500.00	\$38,500.00
Compacted Granular Backfill	604	TONS	\$20.00	\$12,080.00
Finish Grading, Seeding & Straw	1.96	AC	\$10,000.00	\$19,600.00
Total Construction Cost				\$437,840.00
Contingencies (15%)				\$65,676.00
TOTAL				\$503,516.00

Phase II

ITEM				
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$50,000.00	\$50,000.00
18-Inch Diameter SDR 35 PVC Sanitary Sewer Main (Open-Cut Trench Installation)	5,165	LS	\$70.00	\$361,550.00
18-Inch Diameter SDR 21 Class 200 Restrained Joint PVC Sanitary Sewer Main, Through Encasement	115	LF	\$150.00	\$17,250.00
24-Inch Steel Encasement - Simultaneously Bored and Installed Under Fremont Road	55	LF	\$550.00	\$30,250.00
24-Inch Steel Encasement - Simultaneously Bored and Installed Under Longview Road	60	LF	\$550.00	\$33,000.00
48-Inch I.D. Sanitary Sewer Manhole	19	EA	\$3,500.00	\$66,500.00
Asphalt Driveway Repair	15	SY	\$100.00	\$1,500.00
Compacted Granular Backfill	1076	TONS	\$20.00	\$21,520.00
Finish Grading, Seeding & Straw	3.49	AC	\$10,000.00	\$34,900.00
Total Construction Cost				\$616,470.00
Contingencies (15%)				\$92,470.50
TOTAL				\$708,940.50

Design/Inspection Fees (15%) \$158,146.50
GRAND TOTAL **\$1,370,603.00**

This Estimate Excludes:

Solid Rock Excavation

Easement Acquisition

Existing Utility Relocations

Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

8 East Main Street Wentzville, MO 63385 Phone: 636-332-4574 Fax: 636-327-0760	737 Rudder Road Fenton, MO 63026 Phone: 314-842-4033 Fax: 314-842-5957	530A East Independence Drive Union, MO 63084 Phone: 636-584-0540 Fax: 636-584-0512	534 Maple Valley Drive Farmington, MO 63640 Phone: 573-315-4810 Fax: 573-315-4811	2804 North Biagio Street Ozark, MO 65721 Phone: 417-595-4108 Fax: 417-595-4109	905 Executive Drive Osage Beach, MO 65065 Phone: 573-525-0299 Fax: 573-525-0298
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**R-8 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
NEW FINLEY RIVER LIFT STATION TO ELK VALLEY PLANT
OZARK, MO
FEBRUARY 8, 2019**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$160,800.00	\$160,800.00
New Lift Station	1	LS	\$600,000.00	\$600,000.00
Elk Valley Treatment Plant Overflow Basin	1	LS	\$500,000.00	\$500,000.00
18-Inch SDR 21, Class 200 PVC Sanitary Sewer Force Main (Open-Cut Trench Installation)	22,686	LF	\$65.00	\$1,474,590.00
18-Inch SDR 21 Class 200 Restrained Joint PVC Sanitary Sewer Force Main Through Encasement	300	LS	\$100.00	\$30,000.00
24-Inch Steel Encasement - Simultaneously Bored and Installed Under Hwy 65	300	LF	\$550.00	\$165,000.00
18-Inch Diameter M.J. Bends	40	EA	\$1,500.00	\$60,000.00
Air/Vacuum Release Valves	3	EA	\$5,500.00	\$16,500.00
Cleanouts	46	EA	\$3,000.00	\$138,000.00
Asphalt Pavement Repair	77	SY	\$100.00	\$7,700.00
Compacted Granular Backfill	3,403	TONS	\$20.00	\$68,060.00
Finish Grading, Seeding & Straw	15.6	AC	\$10,000.00	\$156,000.00
Total Construction Cost				\$3,376,650.00
Contingencies (15%)				\$506,497.50
Design/Inspection Fees (15%)				\$506,497.50
GRAND TOTAL				\$4,389,645.00

This Estimate Excludes:

Solid Rock Excavation

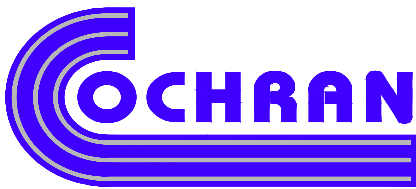
Easement Acquisition

Existing Utility Relocations

Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

8 East Main Street Wentzville, MO 63385 Phone: 636-332-4574 Fax: 636-327-0760	737 Rudder Road Fenton, MO 63026 Phone: 314-842-4033 Fax: 314-842-5957	530A East Independence Drive Union, MO 63084 Phone: 636-584-0540 Fax: 636-584-0512	534 Maple Valley Drive Farmington, MO 63640 Phone: 573-315-4810 Fax: 573-315-4811	2804 North Biagio Street Ozark, MO 65721 Phone: 417-595-4108 Fax: 417-595-4109	905 Executive Drive Osage Beach, MO 65065 Phone: 573-525-0299 Fax: 573-525-0298
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**R-9 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
REDIRECT SHOP LIFT STATION TO NEW FINLEY RIVER LIFT STATION
OZARK, MO
FEBRUARY 8, 2019**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$21,200.00	\$21,200.00
Lift Station Modification	1	LS	\$100,000.00	\$100,000.00
12-Inch SDR 21, Class 200 PVC Sanitary Sewer Force Main (Open-Cut Trench Installation)	3,482	LF	\$60.00	\$208,920.00
12-Inch SDR 21, Class 200 PVC Restrained Joint PVC Sanitary Sewer Force Main Through Encasement	100	LF	\$115.00	\$11,500.00
16-Inch Steel Encasement - Simultaneously Bored and Installed Under W. Jackson St.	100	LF	\$450.00	\$45,000.00
12-Inch Diameter M.J. Bends	9	EA	\$1,000.00	\$9,000.00
Air/Vacuum Release Valves	3	EA	\$5,500.00	\$16,500.00
Asphalt Pavement Repair	10	SY	\$100.00	\$1,000.00
Concrete Pavement Repair	7	SY	\$100.00	\$700.00
Compacted Granular Backfill	350	TONS	\$20.00	\$7,000.00
Finish Grading, Seeding & Straw	2.4	AC	\$10,000.00	\$24,000.00
 Total Construction Cost				\$444,820.00
Contingencies (15%)				\$66,723.00
Design/Inspection Fees (15%)				\$66,723.00
GRAND TOTAL				<u>\$578,266.00</u>

This Estimate Excludes:

Solid Rock Excavation

Easement Acquisition

Existing Utility Relocations

Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

8 East Main Street Wentzville, MO 63385 Phone: 636-332-4574 Fax: 636-327-0760	737 Rudder Road Fenton, MO 63026 Phone: 314-842-4033 Fax: 314-842-5957	530A East Independence Drive Union, MO 63084 Phone: 636-584-0540 Fax: 636-584-0512	534 Maple Valley Drive Farmington, MO 63640 Phone: 573-315-4810 Fax: 573-315-4811	2804 North Biagio Street Ozark, MO 65721 Phone: 417-595-4108 Fax: 417-595-4109	905 Executive Drive Osage Beach, MO 65065 Phone: 573-525-0299 Fax: 573-525-0298
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**R-10 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
SOUTHSIDE SEPTIC ELIMINATION - PHASE I (RED FERN ESTATES & SHERWOOD CT
OZARK MO
JUNE 19, 2020**

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>UNIT COST</u>	<u>TOTAL</u>
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$42,500.00	\$42,500.00
8-Inch SDR 35 Sanitary Sewer Main (Open-Cut Trench Installation)	9,548	LF	\$45.00	\$429,660.00
8-Inch SDR 26 Class 200 Restrained Joint PVC Sanitary Sewer Main Through Encasement	50	LS	\$100.00	\$5,000.00
12-Inch Steel Encasement - Simultaneously Bored and Installed	50	LF	\$300.00	\$15,000.00
4 Foot Diameter Manhole	33	EA	\$2,500.00	\$82,500.00
Asphalt Pavement Repair	66	SY	\$100.00	\$6,600.00
Compacted Granular Backfill	99	TONS	\$20.00	\$1,980.00
Finish Grading, Seeding & Straw	4.5	AC	\$20,000.00	\$90,600.00
Total Construction Cost				\$673,840.00
Contingencies (15%)				\$101,076.00
Design/Inspection Fees (15%)				\$116,237.40
GRAND TOTAL				<u><u>\$891,153.40</u></u>

This Estimate Excludes:

Solid Rock Excavation

Easement Acquisition

Existing Utility Relocations

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737 Rudder Road
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530A East Independence Drive
Union, MO 63084
Phone: 636-584-0540
Fax: 636-584-0512

534 Maple Valley Drive
Farmington, MO 63640
Phone: 573-315-4810
Fax: 573-315-4811

2804 North Biagio Street
Ozark, MO 65721
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**R-11 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
SOUTHSIDE SEPTIC ELIMINATION - PHASE II (RAINEY SUBDIVISION
OZARK MO
JUNE 19, 2020**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$30,000.00	\$30,000.00
8-Inch SDR 35 Sanitary Sewer Main (Open-Cut Trench Installation)	6,551	LF	\$45.00	\$294,795.00
8-Inch SDR 26 Restrained Joint PVC Sanitary Sewer Through Encasement	50	LS	\$100.00	\$5,000.00
12-Inch Steel Encasement - Simultaneously Bored and Installed	50	LF	\$300.00	\$15,000.00
4 Foot Diameter Manhole	27	EA	\$2,500.00	\$67,500.00
Asphalt Pavement Repair	45	SY	\$100.00	\$4,500.00
Compacted Granular Backfill	146	TONS	\$20.00	\$2,920.00
Finish Grading, Seeding & Straw	4.55	AC	\$20,000.00	\$91,000.00

Total Construction Cost	\$510,715.00
Contingencies (15%)	\$76,607.25
Design/Inspection Fees (15%)	\$88,098.34
GRAND TOTAL	<u>\$675,420.59</u>

This Estimate Excludes:
Solid Rock Excavation
Easement Acquisition
Existing Utility Relocations

8 East Main Street
Wentzville, MO 63385
Phone: 636-332-4574
Fax: 636-327-0760

737 Rudder Road
Fenton, MO 63026
Phone: 314-842-4033
Fax: 314-842-5957

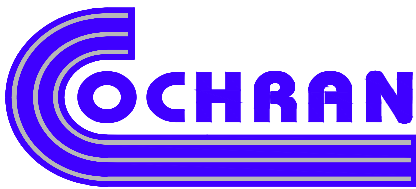
530A East Independence Drive
Union, MO 63084
Phone: 636-584-0540
Fax: 636-584-0512

534 Maple Valley Drive
Farmington, MO 63640
Phone: 573-315-4810
Fax: 573-315-4811

**2804 North Biagio Street
Ozark, MO 65721
Phone: 417-595-4108
Fax: 417-595-4109**

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**R-12 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
NEW CASEYS LIFT STATION (HWY CC AND FREEMONT ROAD
OZARK, MO
FEBRUARY 8, 2019**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$27,600.00	\$27,600.00
New Lift Station	1	LS	\$300,000.00	\$300,000.00
10-Inch Diameter SDR 21 Class 200 PVC Force Main (Open-Cut Trench Installation)	3,913	LF	\$50.00	\$195,650.00
10-Inch SDR 21 Class 200 Restrained Joint PVC Sanitary Sewer Force Main, Through Encasement	55	LS	\$100.00	\$5,500.00
16-Inch Steel Encasement - Simultaneously Bored and Installed Under Fremont Road	55	LF	\$450.00	\$24,750.00
10-Inch Diameter M.J. Bends	10	EA	\$700.00	\$7,000.00
Air/Vacuum Release Valves	1	EA	\$5,500.00	\$5,500.00
Cleanouts	8	EA	\$3,000.00	\$24,000.00
Asphalt Pavement Repair	40	SY	\$100.00	\$4,000.00
Compacted Granular Backfill	400	TONS	\$20.00	\$8,000.00
Finish Grading, Seeding & Straw	2.69	AC	\$10,000.00	\$26,900.00
Total Construction Cost				\$628,900.00
Contingencies (15%)				\$94,335.00
Design/Inspection Fees (15%)				\$94,335.00
GRAND TOTAL				<u>\$817,570.00</u>

This Estimate Excludes:

Solid Rock Excavation

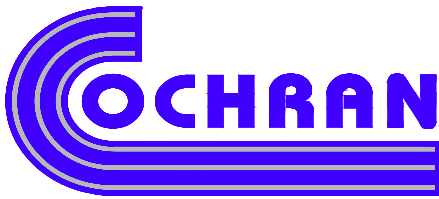
Easement Acquisition

Existing Utility Relocations

Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

8 East Main Street Wentzville, MO 63385 Phone: 636-332-4574 Fax: 636-327-0760	737 Rudder Road Fenton, MO 63026 Phone: 314-842-4033 Fax: 314-842-5957	530A East Independence Drive Union, MO 63084 Phone: 636-584-0540 Fax: 636-584-0512	534 Maple Valley Drive Farmington, MO 63640 Phone: 573-315-4810 Fax: 573-315-4811	2804 North Biagio Street Ozark, MO 65721 Phone: 417-595-4108 Fax: 417-595-4109	905 Executive Drive Osage Beach, MO 65065 Phone: 573-525-0299 Fax: 573-525-0298
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**R-13 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
GRAVITY SEWER FROM PETRUS LIFT STATION TO CASEY'S LIFT STATION
OZARK, MO
FEBRUARY 8, 2019**

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>UNIT COST</u>	<u>TOTAL</u>
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$13,900.00	\$13,900.00
Petrus Lift Station Closure	1	LS	\$50,000.00	\$50,000.00
12-Inch Diameter SDR 35 PVC Sanitary Sewer Main (Open-Cut Trench Installation)	3031	LF	\$55.00	\$166,705.00
48-Inch I.d. Sanitary Sewer Manhole	10	EA	\$3,500.00	\$35,000.00
Connect to Existing Lift Station	1	EA	\$2,500.00	\$2,500.00
Connection for Casey's Lift Station	1	EA	\$2,000.00	\$2,000.00
Compacted Granular Backfill	530	TONS	\$20.00	\$10,600.00
Finish Grading, Seeding & Straw	2.09	AC	\$10,000.00	\$20,900.00
Total Construction Cost				\$301,605.00
Contingencies (15%)				\$45,240.75
Design/Inspection Fees (15%)				\$45,240.75
GRAND TOTAL				<u>\$392,086.50</u>

This Estimate Excludes:

Solid Rock Excavation

Easement Acquisition

Existing Utility Relocations

Cost estimates are based on 2018 prices. Estimates should be increases by 3% to 5% per year to account for cost increases.

8 East Main Street
Wentzville, MO 63385
Phone: 636-332-4574
Fax: 636-327-0760

737 Rudder Road
Fenton, MO 63026
Phone: 314-842-4033
Fax: 314-842-5957

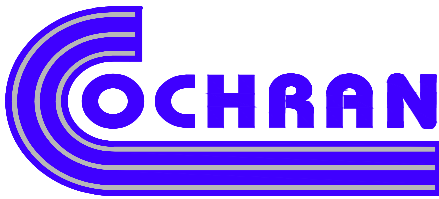
530A East Independence Drive
Union, MO 63084
Phone: 636-584-0540
Fax: 636-584-0512

534 Maple Valley Drive
Farmington, MO 63640
Phone: 573-315-4810
Fax: 573-315-4811

2804 North Biagio Street
Ozark, MO 65721
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**R-14 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
REDIRECT WEST ELEMENTARY LIFT STATION TO CASEY'S LIFT STATION
OZARK, MO
FEBRUARY 8, 2019**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$13,400.00	\$13,400.00
Lift Station Upgrades	1	LS	\$20,000.00	\$20,000.00
12-Inch SDR 21, Class 200 PVC Sanitary Sewer Force Main (Open-Cut Trench Installation)	2350	LF	\$60.00	\$141,000.00
12-Inch Diameter SDR 21, Class 200 Restrained Joint PVC Sanitary Sewer Force Main	55	LF	\$115.00	\$6,325.00
16-Inch Diameter Steel Encasement - Simultaneously Bored and Installed Under Hwy CC	55	LF	\$450.00	\$24,750.00
12-Inch Diameter Class 50 Ductile Iron Pipe for Creek Crossing	180	LF	\$180.00	\$32,400.00
12-Inch Diameter M.J. Bends	7	EA	\$800.00	\$5,600.00
Air/Vacuum Release Valves	1	EA	\$5,500.00	\$5,500.00
Cleanouts	5	EA	\$3,000.00	\$15,000.00
Compacted Granular Backfill	411	TONS	\$20.00	\$8,220.00
Finish Grading, Seeding & Straw	1.62	AC	\$10,000.00	\$16,200.00
Total Construction Cost				\$288,395.00
Contingencies (15%)				\$43,259.25
Design/Inspection Fees (15%)				\$43,259.25
GRAND TOTAL				\$374,913.50

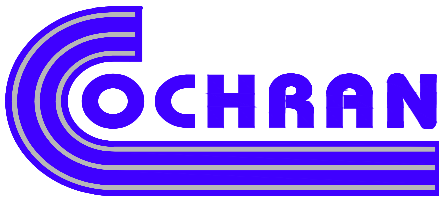
This Estimate Excludes:

Solid Rock Excavation

Easement Acquisition

Existing Utility Relocations

Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.



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**R-15 PRELIMINARY COST ESTIMATE
SANITARY SEWER IMPROVEMENTS
REDIRECT RAPID ROBERT'S LIFT STATION TO CASEY'S LIFT STATION
OZARK, MO
FEBRUARY 8, 2019**

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>UNIT COST</u>	<u>TOTAL</u>
Mobilization, Demobilization, Start-Up, Permits, Insurance, and Bonds	1	LS	\$4,400.00	\$4,400.00
Lift Station Modifications	1	LS	\$20,000.00	\$20,000.00
4-Inch SDR 21, Class 200 PVC Sanitary Sewer Force Main (Open-Cut Trench Installation)	868	LF	\$30.00	\$26,040.00
8-Inch Diameter Steel Encasement - Open-Cut Trench across N. 23rd Street	40	LF	\$100.00	\$4,000.00
4-Inch Diameter SDR 21, Class 200 Restrained Joint PVC Sanitary Sewer Force Main	40	LF	\$50.00	\$2,000.00
Air/Vacuum Release Valves	2	EA	\$5,500.00	\$11,000.00
Cleanout	2	EA	\$3,000.00	\$6,000.00
Connection to West Elementary Force Main	1	EA	\$2,000.00	\$2,000.00
New Concrete Curb and Gutter	5	LF	\$30.00	\$150.00
Asphalt Pavement Repair	39	SY	\$100.00	\$3,900.00
Gravel Road Repair	53	SY	\$30.00	\$1,590.00
Compacted Granular Backfill	136	TON	\$20.00	\$2,720.00
Finish Grade, Seed & Mulch	0.70	AC	\$10,000.00	\$7,000.00
Total Construction Cost				\$90,800.00
Contingencies (15%)				\$13,620.00
Design/Inspection Fees (15%)				\$13,620.00
GRAND TOTAL				\$118,040.00

This Estimate Excludes:

Solid Rock Excavation

Easement Acquisition

Existing Utility Relocations

Cost estimates are based on 2018 prices. Estimates should be increased by 3% to 5% per year to account for cost increases.

8 East Main Street
Wentzville, MO 63385
Phone: 636-332-4574
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Fenton, MO 63026
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Fax: 314-842-5957

530A East Independence Drive
Union, MO 63084
Phone: 636-584-0540
Fax: 636-584-0512

534 Maple Valley Drive
Farmington, MO 63640
Phone: 573-315-4810
Fax: 573-315-4811

2804 North Biagio Street
Ozark, MO 65721
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Fax: 417-595-4109

905 Executive Drive
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Phone: 573-525-0299
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APPENDIX S
CAPITAL OUTLAY STRUCTURE

DRAFT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	*24
Project	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2043
Stormwater Repairs	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Treatment Plant Upgrades*	50,000	1,443,620														
South of Finley River Improvements**		687,500	2,500,000	1,780,411												
Sludge Screw Press at Elk Valley Plant					550,000											
Fremont Gravity Sewer Ph. 1						582,589										
Southside Septic Elimination Ph. 1							891,153									
Southside Septic Elimination Ph. 2								675,420								
Fremont Gravity Sewer Ph. 2									788,014							
Casey's Lift Station & Forcemain										817,570						
Gravity Sewer from Petrus to Casey's L.S.										392,086						
West Elementary Forcemain Redirect										374,913						
Rapid Roberts Forcemain Redirect										118,040						
Lambert's Lift Station Upgrades													600,000			
Elk Valley Sister Plant														12,000,000		
Elk Valley Expansion - 4.0 MGD																2,250,000
Lift Station & Force Main to Replace North Plant																
Close North Plant																
TOTAL	350,000	2,431,120	2,800,000	2,080,411	850,000	882,589	1,191,153	975,420	1,088,014	2,002,609	300,000	300,000	900,000	12,300,000	300,000	2,550,000
	YR 1-5 TOTAL				8,511,531	YR 6-10 TOTAL				6,139,785	YR 11-16 TOTAL				14,100,000	

*Includes clarifier improvements, sludge return improvements, emergency generator and grit removal improvements
 **Includes Finley River Lift Station and Forcemain to Elk Valley, Shop Lift Station Redirect and Elk Valley Overflow Basin

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	24
Long Term Debt (Sanitary Sewer)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2043
2006A SRF	577,586	566,062	551,112	548,050	537,150	525,775	516,925	501,600	Retired							
2007A SRF (WWTP)	1,133,925	1,138,141	1,134,044	1,135,862	1,134,775	1,134,100	1,136,406	1,134,262	1,136,859	1,134,281	Retired					
2012 WW/SS Refunding Rev. Bond				34,095	27,925	26,950	25,975	Retired								
TOTAL	1,711,511	1,704,203	1,685,156	1,718,007	1,699,850	1,686,825	1,679,306	1,635,862	1,136,859	1,134,281	0	0	0	0	0	

	\$10 for 1st 1,000 gal; \$8.00/1,000 gal (+/- \$10 per month increase)															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	24
Additional Revenue From Rate Increase	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2043
Customer Count (2% growth)	7,500	7,650	7,803	7,959	8,118	8,281	8,446	8,615	8,787	8,963	9,142	9,325	9,512	9,702	9,896	11,827
Additional Annual Revenue	0	918,000	936,360	955,087	974,189	993,673	1,013,546	1,033,817	1,054,493	1,075,583	1,097,095	1,119,037	1,141,418	1,164,246	1,187,531	1,419,209

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	24
Net Annual Change in Reserves	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2043
Annual Reserve Level Change	(350,000)	(1,513,120)	(1,863,640)	(1,125,324)	124,189	111,084	(177,607)	84,372	494,054	(399,451)	2,458,951	2,480,893	1,903,274	(9,473,898)	2,549,387	531,065
Cumulative Reserve Level Change	(350,000)	(1,863,120)	(3,726,760)	(4,852,084)	(4,727,895)	(4,616,811)	(4,794,418)	(4,710,046)	(4,215,991)	(4,615,442)	(2,156,491)	324,402	2,227,675	(7,246,223)	(4,696,836)	1,933,645
Reserve Level (\$10 Million)	9,650,000	8,136,880	6,273,240	5,147,916	5,272,105	5,383,189	5,205,582	5,289,954	5,784,009	5,384,558	7,843,509	10,324,402	12,227,675	2,753,777	5,303,164	11,933,645

* From year 2035 to year 2043 \$2.25 million is budgeted per year to pay for the Elk Valley Treatment Plant Expansion to 4.0 MGD that costs \$20.25 million.